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# The International Journal of Orthodontia, Oral Surgery and Radiography

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VOL. XIV

ST. LOUIS, SEPTEMBER, 1928

No. 9

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## ORIGINAL ARTICLES

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### PRESIDENT'S ADDRESS\*

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BY DR. W. R. DINHAM, SEATTLE

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AFTER enjoying the benefits of this society for many years, you have extended me the high honor of being your presiding officer and I find it difficult to express in words my sincere appreciation. I shall be very grateful however, if I can leave with you a few thoughts that may prove of interest.

Since our last meeting we have seen the greatest achievement in the history of our specialty, in the holding of the first International Congress, and all who attended realized that much can be gained by closer association with our foreign colleagues.

There, gathered in one room were men from many foreign lands, all with one aim, that of improving the mind by an interchange of ideas and contact with others, hoping that by this association, our service to humanity might be enlarged, and demonstrating that science knows no international boundary lines.

Orthodontic problems are similar the world over, and many valuable contributions came from across the waters. No science can develop as readily when confined to a limited area; the larger the group, the greater the possibilities for new developments.

In passing I feel I must express my great admiration for the splendid manner in which Dr. Wm. Fisher conducted the meeting and his tireless efforts in making that occasion possible.

The week following the first International Congress of Orthodontists, the seventh International Dental Congress convened in Philadelphia. The Orthodontic Section, as you all know, was presided over by Dr. B. E. Lischer of St. Louis. Following so closely after the first International Congress of Ortho-

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\*Read before the Pacific Coast Society of Orthodontists, San Francisco, Feb. 20-22, 1928.

dontists, it was no small task to formulate a program which would command for our specialty a respect equal to that of the other branches of dentistry which had months to prepare, with nothing to detract from their efforts.

The Orthodontic Section was replete with valuable and instructive contributions, and Dr. Lischer deserves great praise for the able manner in which our specialty was represented.

One of the demands of society upon those engaged in the practice of medicine or its allied branches, is progress in prevention as well as treatment. We are greatly indebted to such men as Drs. Percy Howe, John Marshall, McCollum and others for their scientific findings in nutrition. With the increased knowledge that these investigators have labored so diligently for, let us pass it on to those with whom we come in contact. Dr. Hoffman's method of impressing upon the minds of his patients, by the use of nutrition charts, the value of proper food combinations, is very commendable.

All children presented for orthodontic treatment should be carefully weighed and measured; a surprisingly large percentage are underweight. Although all cases of malnutrition are not due to insufficient or improper food, but rather to some physical disorder, many times a systematic check-up on our patients would place us in a position to advise the parents of the necessity for medical advice. Often children with such evidences of malnutrition as: lines under the eyes, round shoulders, projecting shoulder blades, fatigued posture, and nervousness, are placed under orthodontic treatment when a delay until a general improvement in health would be a decided advantage to all concerned.

I believe that scales and a measuring chart should be a part of the equipment of every orthodontist; and would do much toward educating the child and parent as to the importance of a properly balanced diet.

It has been said that malocclusion is on the increase, a state of affairs that is to be regretted, in view of the fact that the last twenty-five years has seen a very creditable inquiry into causative factors. Year after year, we add a few more links to the chain of causality, each investigator having ample proof that his discovery plays a most important part, until it is bewildering when we stop to analyze the innumerable causative factors, many of which may be dependent upon preceding causes.

It is most necessary to continue this inquiry and encourage investigation, for progress in preventive orthodontia must advance. But for orthodontists to entertain any hope of successful treatment due to their ability to detect and remove the cause, seems improbable.

Even if we do know the underlying cause of the anomalies we are to correct, in many cases it would prove of no value in treatment. This knowledge, however, is valuable in preventive orthodontia, and with case histories of all patients upon a standardized form, investigators could draw from orthodontists a great deal of information, which when compiled, no doubt would be of great value in shedding more light on the field of causation, and increasing progress in prevention.

The status of orthodontia, so far as the general practitioner and the layman are concerned, is determined by the ultimate result of treatment, in accordance with intelligent prophylaxis.

Our problem, therefore, consists of:

1. A diagnosis of the anomaly.
2. A recognition of such existing known factors which may influence the permanency of the conclusion, among which are: pernicious habits, age of patient, abnormal breathing, malnutrition, pillowing and postural pressure, lack of proper development of the facial muscles and muscles of mastication, possibilities of endocrine disturbances.
3. Orthodontic limitations.
4. An honest appraisal of our own ability, before we make any rash promises.

The success of treatment depends largely upon:

1. The orthodontist's ability to overcome these existing, known factors.
2. A correct conception of the anomaly.
3. I agree with Dr. P. M. Casto in his discussion of the "President's Address before the American Society of Orthodontists, 1925," in which he stated: "Without decrying the necessity or minimizing the value of a thorough, careful and intelligent diagnosis of malocclusions, I am constrained to believe that more failures are the result of the unscientific and mediocre construction and the careless and unintelligent use of appliances than any other cause."
4. The cooperation on the part of the patient.

This Society is highly honored on this occasion to have as its guest, a man who has recognized and demonstrated conclusively the important part normal development of the facial muscles and the muscles of mastication plays in the treatment of malocclusion. I am sure that all of us welcome the opportunity of knowing more of Dr. Rogers' methods, and are indeed grateful that he should be willing to travel across the continent to help us solve our problems.

Methods of diagnosis in recent years seem to be occupying the attention of many of our foremost writers and, in view of the fact that correct diagnosis is most essential, and the lack of which no doubt may be the cause of many failures, it is a subject that should be dealt with in an unprejudiced and impartial manner. It is generally recognized that we should not consider the denture as a separate unit, but as a part of the head and any means which will give us a clearer understanding of this relationship is valuable. The usefulness of any method is also dependent upon the possibilities of application in our every day practice.

Dr. Paul Simon has given us a method which conforms to these requisites; and his book entitled, "A Systematic Diagnosis of Dental Anomalies," which was translated to the English by Dr. B. E. Lischer, should be carefully studied by all orthodontists, regardless of whether or not his methods are adopted. It is the result of many years of painstaking work, and opens a new avenue of thought.



Recently a lengthy editorial denouncing everything from the usefulness of the eye-ear plane to the words used in classification, appeared in the *INTERNATIONAL JOURNAL OF ORTHODONTIA*. While criticism should always be welcome, it should also be of a constructive nature, especially so of a subject of such vital importance as diagnosis. Investigators in this field should be given every encouragement, and a very thorough inquiry as to the value of their conclusions should be made. Many able and nationally recognized orthodontists have received a great deal of satisfaction since adopting Simon's method, and can demonstrate its usefulness.

We can recall the severe criticism to which the lingual arch has been subjected. It has been referred to as the "Jiggling Appliance," yet we all know and can prove its value and usefulness. The clamp band whose exponents still persist in clinging to, over which, if the correct technic is followed, the type of band more universally used today has many advantages.

James Harvey Robinson, in his essay on "Four Kinds of Thinking," has said, "That few of us take the pains to study the origin of our cherished convictions; indeed, we have a natural repugnance to so doing. We like to continue to believe what we have been accustomed to accept as true, and the resentment aroused when doubt is cast upon any of our assumptions leads us to seek every manner of excuse for clinging to them."

The result is that most of our so-called reasoning consists in finding arguments for going on believing as we already do.

It is not my purpose to enter into the discussion as to the merits of Angle's or Simon's deductions, for the mere fact of including Simon's method in our routine of diagnosis does not necessarily mean that we must disregard all personal opinions gained from years of experience, nor does it mean that we must disregard intraoral relationship of the dentures or of typal characteristics. All these we still have the privilege of considering, and they will do much toward broadening our vision, likewise helping us make our decision as to treatment.

There are some verses by John Godfrey Sax called "The Blind Men and the Elephant," which are very instructive:

According to Sax, six wise men of Indostan, all of them very wise, but all of them blind, went to see the elephant. One examined its side and declared the elephant was very like a wall; another, feeling its trunk, was sure the elephant was very like a snake; another concluded from its leg that it was very like a tree; another, examining its tusks, knew that the elephant was very like a spear; the expert who examined its ear found it to resemble a fan, and the authority who grasped its tail was certain that the elephant was very like a rope.

According to the legend they are still disputing over it. We can well imagine one of them saying, "If a thing is so, it is so, and you can't get around it. My senses bear me witness; the elephant is very like a snake."

Now, there is a lesson to be gained from this legend, and it is very gratifying to all of us to know that in our specialty an earnest effort is being made to gather all the facts in relation to a subject and to correlate them. This is the scientific way of investigation, for as Dr. Milo Hellman has said, "Belief does not count in scientific work."

The proposed research on bone changes, to be conducted by Dr. John Marshall and Dr. K. F. Meyer, will no doubt be of great value in establishing the relationship of diet to bone growth stimulated by appliances. By similar means it may be possible to settle the argument concerning the rapid movement of teeth. It also seems reasonable that if teeth may be moved in three directions, a system of measurement, whereby mathematical deductions before and after treatment which would substantiate many of our opinions as to just what happened, would be useful.

In conclusion, I wish to voice my sincere appreciation to the directors of this Society for their efforts; and to Dr. Robert Dunn, upon whose shoulders usually falls the heaviest burden in the formation of our program, I am sure each and every one of us is truly grateful.

Since our last meeting our Secretary, Dr. Carl Engstrom, found it necessary to resign. His loss was keenly felt by the directors. This Society has benefited largely through his efforts during the past seven years. We are indebted to him for our present Constitution and By-Laws, our present method of conducting the affairs of the Society and the formation of the various sections with the many advantages of group study. I feel that I am voicing the sentiment of the entire Society when I say the quotation, "Well done, good and faithful servant," is applicable to him.

Dr. F. A. Leslie was, as you all know, elected to fill the vacancy created by Dr. Engstrom's resignation, and although he was at a decided disadvantage in not being familiar with the many duties connected with this office, is deserving of much praise for the very efficient manner in which he has carried on this work.

Our program this year offers an usual opportunity for us to increase our knowledge. By incorporating the "Round Table" idea of discussion, we feel that opinions not often expressed in the general meeting will be brought out, and that men from our different sections will have an opportunity to know their fellow practitioners better.

Probably no man occupies any greater degree of respect and admiration of the members of this Society than our honorary member, Dr. Albert Ketcham. His recent investigations on root resorption has stimulated a keen desire for further studies along this line. It is through such men as he, whose investigations are based upon statistical evidence, that our knowledge is increased, and the least we can do is to heed his warning, and by a radiographic check-up, assist him in the work he so ably has started.

To have Dr. Ketcham with us on this occasion is a great privilege and to listen to his message should inspire us to higher ideals for our beloved specialty.

#### DISCUSSION

*Dr. Allen H. Suggett, San Francisco.*—It is a pleasure to discuss a forward-looking paper as this one is. The president has called our attention to the most important things that are holding the attention of orthodontists over the world today. They are the unsolved problems that he has mentioned, including nutrition, etiology, muscular development, preventive orthodontics and diagnosis.

There are groups of researchers working on all of these problems at the present time. Stallard and others are earnestly working on some of the phases of etiology and their findings are most interesting.

Marshall and his group have been working for several years on nutrition, and of course, you all know that he is starting a very serious investigation of root absorption at the University of California. This work is financed by the orthodontists of the country and I am sure it will lead to something highly worth while. The university is heartily in accord and as time goes on, I am sure it will support it more and more.

Clint Howard of Atlanta is working with a group on the action of the endocrine glands. He has from time to time read some interesting papers that have been well received by different scientific societies throughout the country.

Alfred Rogers, the high priest of musculature, from the city of crooked streets and straight orthodontists, is here in person. He will teach us to do some wonderful things with our muscles. He will show us how to develop them and control them so perfectly that Mona Lisa's smile will look like a smirk to us and we will have such control that we can keep from laughing even while reading Dewey's editorial review of Simon's book.

Simon and Swartz, as you know, have worked on cephalometric diagnosis for several years. This subject has aroused a great deal of interest and quite a lot of criticism. Most of the criticism has shown a lack of understanding of the technic. We heard the same criticism of the lingual arch, and muscle development by men who were not familiar with the technic.

All of us who have become familiar with gnathostatics and have used it for several years have found it reveals more and more to us as we apply it to the various extreme cases.

I was very much surprised and disappointed at the extreme and sweeping editorial review by Dr. Dewey of Simon's book. He seems to totally misunderstand what it is all about and he has surely failed to grasp the technic and philosophy of cephalometrics. To look out on a level valley and forthwith proclaim that the world is flat is easy and simple, much simpler than to sail around it. Such sweeping pronouncements are no credit to as able and clear thinking a man as Dr. Dewey has often shown himself to be.

*Dr. H. L. Morehouse, Spokane, Wash.*—I think Dr. Dinham deserves a great deal of credit for covering the subject of orthodontia and its advancement in one way and another in the past two years, since our last meeting. I think that every branch of orthodontia which has been brought forward, whether it is the question of root absorption, food control or diagnosis, is of primary importance.

I feel we have reached, as Dr. Dinham has intimated, the point where we can divert our ideas and our studies to a more or less degree from the mechanical to the more scientific phase of orthodontia and I think in Dr. Dinham's paper, as the President's address, has brought out the points in an admirable way and I wish to thank him for the presentation.

*Dr. James D. McCoy, Los Angeles.*—Dr. Dinham has included so many points of interest in his address that it is a little difficult to know just where to start in on a discussion. I think one of the important things he has called to our attention was the suggestion that in making a diagnosis or in voicing a prognosis where treatment is contemplated, we should be reserved in our statement as to the possibilities of treatment. I believe we have fallen into the error, during the past two decades, in our efforts to impress the necessity of orthodontic treatment upon the parents, of being a little over optimistic in what we feel might be accomplished through treatment. I believe we must come to the realization that one hundred per cent results are not always possible in every case. In fact, with the limitations under which we must work, I think that successful results are often obtained, if we use the term success in its true light. Sometimes it is possible to get one hundred per cent results, but to give the impression to people that it is always possible to do that is extremely unjust to ourselves and to our specialty.

I was glad that our President brought up the question of Dr. Simon's contribution to orthodontic diagnosis. My personal belief is that Dr. Simon, has very materially broadened the field of diagnosis. I believe he has given us the most helpful contribution to this field



which has come to it during the last decade. I believe that his book is perhaps the most "thought-provoking" book on orthodontia which I have ever read. I do not now agree with him in all that he says, but perhaps after I understand his viewpoint better I may believe all that he believes. If I could only agree with him in twenty-five per cent of his ideas, I think his book if read carefully and studiously and tolerantly will make us *think* more than any other book on orthodontia today.

It seems to me that the orthodontist of today who takes his impressions and makes casts and does not use the gnathostat is doing himself and his specialty a great injustice. I believe this because it provides a simple and accurate method whereby we can make casts which we look at and see the denture in its relationship to the other facial structures. In other words a gnathostatic cast is not an unrelated object like the ordinary dental cast. It has a definite relationship to certain other facial landmarks. In addition to this, when we treat our cases, regardless of the policy we pursue, when we get through we have a definite means of telling what changes we have brought about. This is something which is absolutely new to us and which we have never been able to do before, although we did not realize it.

Our President touched upon one other subject which I believe deserves our interest and support and that is the research plan being carried out under the direction of Dr. Marshall and Dr. Carl Meyer at the Hooper Research Institute here in San Francisco. This is an opportunity for all orthodontists to participate in a research plan inaugurated by orthodontists and carried out for the good of orthodontia.

Orthodontists in many respects are not unlike dentists, we have been good receivers, but not good broadcasters. We have been enthusiastic about any absorption plan but not very strong on any building up plan. It is a regrettable fact that in our ranks there is not a larger percentage of public-spirited men.

We can not all support the research plan through our personal work, but at least we can support it financially. If it becomes necessary we can give fifty or a hundred dollars a year for the next two, three, four or five years, regardless of how long it may be, to finance this experiment in research and all those problems related to it, to a point where certain helpful things can be determined. Unless we do it, we are not fulfilling the obligations which rightfully fall upon every professional man.

*Vice-President Read.*—The discussions are improving, I think. Dr. Suggest attracted our attention so much that we nearly forgot the paper. Does anyone else wish to speak? President Dinham certainly brought up enough issues and points to stay here all day and discuss. If there is no further discussion, we will ask Dr. Dinham to close.

*Dr. Dinham.*—I am not going to add anything to my original paper, except to thank the gentlemen who discussed it and for the kind reception. The program is a little behind time now and we will continue right along with our next subject.

THE NECESSITY OF PLACING THE MANDIBULAR MODEL IN THE  
PROPER RELATION TO THAT OF THE MAXILLA FOR THE  
PURPOSE OF CONSTRUCTING ARTIFICIAL DENTURES\*

BY DR. C. O. EDWARDS, OAKLAND

THE necessity of placing the mandibular model in the proper relation to that of the maxilla for the purpose of constructing artificial dentures may have some bearing in solving problems that confront the orthodontist. I am not going to burden you with too much technic and will consider some of the facts that must be executed absolutely accurately to obtain the best results in prosthesis.

To establish the denture space at normal closure, which is the normal distance between the two models when the artificial teeth are in central occlusion, is the first step. Some of this technic you will find in the following. The full technic will be found in the January, 1927, issue of the *Pacific Dental Gazette*, written by Dr. E. K. Peters of Long Beach, California, and myself. I want to call your attention to that part which deals with "Esthetics by Lip Action" and "Registering Central Occlusion."

The four maxillary anterior teeth are so arranged in the denture space to give the best appearance to the upper lip for esthetics and speech. This arrangement, however, must allow the lower lip to function with the incisal edges of the maxillary incisor teeth in a valve-like motion to produce a distinct and perfect sound in speech of all *F* and *V* sounds, as: before, if, off, after, fifty-four, etc.

The mandibular incisor teeth must be arranged so that all *S*, *C*, *Sh*, and *Ch* sounds can be produced clearly and distinctly.

The perpendicular length of the premolars and molars are so placed that these teeth will function in mastication and speech without producing lip strain when the lips are closed during mastication of foods. The difference in the perpendicular length of the incisor and molar teeth when set to correct length and position for speech and mastication gives us the proper face length and automatically establishes the overbite and overjet.

The overbite and overjet of the teeth and the direction traveled in the movement of the condyle automatically establishes the curve of Spee. In other words, if you establish the proper setting of the six anterior teeth and the excursion of the condyle in protrusion and right and left lateral motions starting from central occlusion, the curve that exists between these points along the occlusal surface of the premolar and molar teeth automatically and without consideration forms the curve of Spee. This will allow the entire denture to function in speech and mastication without causing inharmony with their component anatomic neighbors when the teeth come in contact. This means that the curve of Spee is not a prearranged curve. The movements of the mandible are opening, protrusive, retrusive, and lateral starting from centric occlusal relation.

\*Read before the Pacific Coast Society of Orthodontists, San Francisco, Feb. 20-22, 1928.

Obtaining centric occlusal relation is the most important step. This is worked out with base plates supporting flat occlusal rims, the upper holding a path marker to record Gysi Gothic arch, and the lower with horseshoe plate attached. The Gothic arch is used as a checking guide only.

By the use of waxed paper feelers, one for each side, we determine where the first contact occurs at normal closure. The high areas must be reduced or the deficient one built up to maintain the established denture space. A perfect centric relation will occur when the entire surface of the bite rims and the marking pin find their respective places simultaneously at zero contact which is contact without plus or minus power. When this degree of accuracy is obtained the base plates will not shift their relation to each other under the strain of plus power. We do not know of a more accurate test for centric occlusal relation of the mandible to the maxilla. Should we find that the denture space must be changed, which would be opening or closing the bite, a new registration of central occlusion must be obtained. We do not know of an articulator on which the denture space can be changed without changing the bite (level of contact). This accuracy must be carried through the entire construction to get the best results.

The fact that one-thousandth of an inch difference in the level of contact (of the occlusal rims at zero contact) will not give a perfect central occlusion in a case where the mandible is easily strained, leads us to believe that the heavy contact of one or several teeth that are being moved in orthodontics, high fillings, crowns, bridges, or malplaced teeth cause an abnormal excursion and position of the condyle head. We find in edentulous cases, where there has been a habitual displacement of the mandible (out of centric relation) from the foregoing causes even over a long period of time, that by due diligence and perseverance in establishing central occlusion the condyle head will gladly go back to its normal at-rest relation if supplied with its proper rest and functioning supports. These are accurately prepared bite rims or artificial dentures. The teeth if not in harmony with the normal function of the mandible, may be a cause for relapse in orthodontic treatment.

Malocclusion in artificial dentures is a cause of trauma, resorption of tissue, and displacement of dentures. Will it do the same in the natural denture? Could any of the failures in orthodontia be traced to the fact that in moving the teeth to gain esthetics they are so arranged to produce an inharmonious coordination between the teeth and the other anatomic functions of their associated anatomy? If so, this malocclusion would throw the strain in the condyle region and reflect to the muscles of the jaws when guided by the teeth.

We also find in recording condyle movements that the excursion of the condyle head does not always register the same inclination in the lateral movement that it does in a straight protrusive movement. This is due to unbalanced muscle pull forcing the condyle heads along a different position in the fossi which may involve, if overstrained, a retrusion on one side and a protrusion on the other from central occlusion. In recording a lateral record, it must be so constructed that an unstrained balance exists between it and the condyle head on the working side. The record on the balancing side must be slightly strained by a slight crushing force on the working side. This in arti-



ficial teeth allows the working side to function in mastication without interference from the balancing side which comes in play just before the dentures loosen from their foundation. Therefore, we must change our condyle setting of the instrument from the protrusive setting to meet the records taken in the lateral for many cases. Such a change requires working out a balanced occlusion in these different positions. This is done by starting at central occlusion with the machine set in protrusive, using these positions only to arrange the teeth, then change to the right and left laterals making changes from lateral to protrusive and protrusive to lateral until harmony exists in central occlusion (lateral, protrusive, and intermediate movements).

The general public when paying a fee for orthodontia expect a perfect symmetrical alignment of the teeth when finished, regardless of whether the angles of the face call for that arrangement or not. There are few faces that can wear artificial teeth so arranged without causing them to look most unnatural.

The setting of artificial teeth to conform with the angles of the face, thus producing harmonious highlights and shadows, the working out of the mechanical side correctly with the result that a more attractive reflection is coming from that face at all times means better esthetics.

There could be produced in orthodontic treatment, as well as in artificial teeth construction, a full occlusion of the entire set of teeth and not have them in (normal at-rest) centric occlusion. In this condition the patient could not place the teeth in full occlusion without a strained relation of the mandible, with the result that there would be no mandibular rest as long as this condition existed. Eventually the teeth would move from their settings for esthetics to a relapse. In the artificial there would be produced ridge soreness, atrophy of their supporting tissues and instability of the dentures, as well as a tired feeling in the region of the condyle and along the ramus, a very unsatisfactory conclusion of our efforts.

#### DISCUSSION

*Dr. B. Frank Gray, San Francisco.*—I have suspected for a good while that there were matters of vast importance that should become common knowledge to the prosthetist and to the orthodontist. However, it does seem there has been some sort of barrier between the two specialties that has kept them from knowing much about each others' problems. We have had denture men before our orthodontia meetings on several occasions who have tried to approach the subject of the relation of the mandible to the maxillae in a way that would help us, but too often there has remained the same lack of mutual understanding so that we have not felt much enlightened.

Dr. Edwards has explained how the curve of Spee is secured in his work. It is in fact, a result of normal occlusion I would say, and I believe orthodontists have paid too little attention to it. I think the principal reason for this neglect has been the wide-spread feeling that since a large percentage of malocclusion deals with the denture in its period of development, i.e., before the completion of the eruption of the premolar, cuspid and second molar teeth, that a reasonable approximation of "normal occlusion" would ultimate in all necessary additional adjustments through the completion of dentition and through the function of the masticatory apparatus. Thus in due course of time the Curve of Spee would be properly established. Personally I think there is some virtue in such a consideration, but I have come to think we cannot take too much for granted. Certainly whether the dentition is completed or not, we must keep in mind the ultimate requirements.

A variation of one thousandth inch in the level of contact may result in failure of perfect central occlusion the essayist tells us, and thus he thinks the "heavy contact of one or several teeth that are being moved in orthodontics, high fillings, crowns, bridges, or malplaced teeth cause an abnormal excursion and position of the condyle head." I think there is no doubt about that, and his findings in edentulous cases where the mandible is displaced from the above causes show the condyle head may be re-established in its normal relation. This is in keeping with our experience, and thought about the matter, I am sure.

As to malocclusion in the natural denture causing trauma, resorption of tissue, etc., no doubt trauma does result very often in just such instances. Whether trauma is such a bugbear as is represented by many of our good men in prophylaxis work, I am not sure. It seems to be a disputed question.

Dr. Edwards inquires whether in moving teeth to certain relations to gain esthetics, an inharmonious coordination between the teeth and the other anatomical functions of their associated anatomy may not result?

What is normal occlusion? Orthodontists have been taught a certain ideal occlusion which they have considered to be normal occlusion. The fact that relapses may come in treated cases may be due to any one of numerous causes. In the first place, granting the ideal or normal occlusion striven for was correct, the operator may have failed to attain his ideal. Secondly, possibly it was not the ideal for that patient. Third, there may be wrong muscular coordination quite apart from any arrangement of the teeth that may result in bringing about a recurrence of the malocclusion.

As to the public demanding a perfect symmetrical alignment of the teeth regardless of whether the angles of the face call for such an arrangement or not, and the statement that artificial teeth so arranged cause them to look unnatural: I think the natural denture of a young person is hardly comparable to the artificial denture in these regards. Even in the same mouth I think this is true, and more particularly is it not comparable to the artificial denture in an adult mouth. I think there are certain strained muscular relations, or a lack of something vital to the appearance of the denture in the edentulous mouth, that may never obtain with the natural teeth.

Granting there may be opening up to orthodontists a new and important field of helpful work as suggested by Dr. Edwards, how shall we approach it? Shall we mount accurately made models on a proper anatomical articulator? That will show what we may already know—that there is no proper masticatory function. Shall we then carefully cut the plaster teeth from their base and wax them to their place—"set them up" if you please, just as the denture specialist would do? Thus we may secure an anatomical arrangement of the case. We may then keep this model before us and from certain careful measurements and observations we may strive to bring the natural teeth to a corresponding arrangement. All this is much easier to plan than to execute.

I am in entire agreement with Dr. Robert Dunn that orthodontia needs several lines of research to be followed out. From my own inquiries over the country I am satisfied there is the vaguest sort of feeling regarding the relation of the mandible to the maxillae. Even when satisfactory corrections of distocclusion cases are accomplished, no one knows just exactly what they have done.

I am sure every orthodontist here appreciates Dr. Edwards' thought-provoking paper.

*President Dinham.*—The paper is open for general discussion and Dr. Edwards has made the request that if anyone has questions, he will be glad to give you any more thoughts along those lines. If you have any question you wish to ask regarding this paper, Dr. Edwards will appreciate it very much.

*Dr. Robert Dunn, San Francisco.*—I am sorry I was unable to present my offering at this time because it has a direct bearing upon some of the points Dr. Edwards has brought out. We as orthodontists have been devoting most of our time and attention apparently to the maxillae and not considering the mandible as a factor of little importance in producing malocclusion of the teeth. We have got to change that idea, gentlemen, for you are going

to find in the near future, that the mandible takes a very important part in the production of malocclusion of the teeth.

In my study of vertical development this has been brought very forcibly to my mind. It is a subject that requires a great deal of time and a great deal of research in matters not obtainable on the Pacific Coast and therefore, naturally it is quite slow.

I would like to ask Dr. Edwards, particularly when he has presented to him a case for the making of a denture where there are teeth in the mouth and possibly there has been what you may say is normal occlusion on the one side and a distocclusion on the other, does he find that the mandible is out of position, or if so, does it go back or what has been his practical experience in his prosthodontic work in such cases?

*President Dinham.*—Any other questions?

*Dr. James D. McCoy, Los Angeles.*—I would like to ask a question regarding the measurements that prosthetists use. The question is this: Has Dr. Edwards ever taken casts of ten or fifteen or twenty-five cases where normal occlusion is present, that is where there is a normal functional relationship evident in a mouth; and with the face bow and the other various measurements and instruments found that such cases registered a one hundred per cent in accordance with what the instruments say the functional movements should be?

*President Dinham.*—Any more questions?

*Dr. W. J. Bell, Los Angeles.*—I would like to ask Dr. Edwards if he actually means 100 per cent perfect. Personally, I have never seen a 100 per cent set of teeth. It is like checking on the so-called 100 per cent features. In fact, very few would check beyond 75 to 80 per cent.

In my opinion it is much easier to make a set of artificial teeth with good occlusion than it is to correct malocclusion in the natural jaws to the normal occlusion.

We must consider in developing the maxilla and mandible to the normal relation that when two or more forces are applied the anchor teeth are liable to get out of alignment.

To establish the mediobuccal and buccal lingual relation in my opinion is a much more difficult problem for the orthodontist than it is for the prosthodontist because the prosthodontist can place a tooth in any desired position; this, the orthodontist cannot always do.

However, there is no reason why by orthodontic treatment we should not do our best to help these little patients so they can masticate their food better and improve their health and looks even though the ideal is seldom realized.

*President Dinham.*—Dr. Edwards, we will ask you to close the paper.

*Dr. Dunn.*—Should the mandible assume a strain-position because of high fillings, bridges, or distorted teeth (a position which can remain after complete extraction).

Artificial teeth will not function comfortably until normal central occlusion position of the mandible is established which can always be accomplished by following the technic given in the paper.

*Dr. McCoy.*—I have mounted models of natural teeth on the Kinoscope by the face bow and adjusted the machine so that the function of mandibular movements were perfect as near as the eye could detect.

The degree of inclination of the condyle path however may not be the same as indicated on the machine.

*Dr. Edwards, Oakland.*—When we speak of one hundred per cent we do not do so as an artist or sculptor would select his model. The one hundred per cent is individual to that patient when restoring a part that has been lost or malimposed. We do not obtain one hundred per cent in artificial teeth for they are just what their name implies (artificial).

We speak of one hundred per cent occlusion in artificial teeth which means the mandible



must be in an unstrained position and the teeth in their respective places to perform all their normal functions comfortably and without interfering in speech or mastication.

The overbite and overjet in artificial dentures may be increased to accommodate over ridge position of the mandibular teeth for the purpose of stabilizing the lower denture without changing the function of speech. The change being made in the lower incisor region when the *S* sound is produced with the incisal edges of the mandibular teeth well towards the gingival lingual margin of the maxillary teeth instead of their incisal edges.

A heavy overbite and overjet always prevent at least the premolars from occluding when the incisor teeth touch edge to edge as shown in "Esthetics by Lip Action," a position of the mandible which does not exist only in incising foods.

Traumatic occlusion in artificial dentures is one of the main causes of prolonged ridge soreness.

The most likely cause for traumatic occlusion is in not obtaining the proper relation of the mandibular model to that of the maxillary during the arrangement and finishing of the teeth.

*Dr. Dunn, San Francisco.*—Dr. Edwards, just what is the value in the artificial denture of the Curve of Spee? Can an artificial denture be constructed without the Curve of Spee and be satisfactory?

*Dr. Edwards, Oakland.*—A patient wearing any artificial restoration or having mal-placed teeth, crowns, bridges, or fillings will present a problem in registering central occlusion when constructing a full set of dentures. These patients appear to have a conscious and an unconscious bite.

The unconscious bite is the normal at rest central occlusion, and what part of the anatomy allows this change I do not know. There was no doubt an unilateral occlusion of the mandible before extraction. The patient, after becoming edentulous, will generally have a change take place in the condyle region which may be in the bursa or the condyle head. There also appears to be a change in the angle of the ramus as well.

Now answering Dr. McCoy's question we cannot use our articulator as a square or compass, but it is used as a big lathe with adjustments to be adapted to the work required.

In setting the face-bow should we not judge the correct rotation point of the condyle heads, the articulator should have a large enough range to tune out this static (or error) and the models will function on the machine as the teeth do in the mouth.

The inclination indications on the machine however are not the same as the condyle inclination.

*Dr. Dunn.*—That is what you would have if you get an end to end bite?

*Dr. Edwards.*—Yes, providing the inclination of the condyle paths are horizontal and the teeth have an edge to edge bite.

*Dr. Dunn.*—In your experience have you come to any conclusion as to whether, for instance, if you have what appears to be a malrelation of the mandible to the maxilla or cranium, in your opinion do you feel that there has been a change in the condyle head or the ramus of the mandible, or do you feel that the change has been taken care of possibly by the bursa and that there has been no radical change in the shape or form of the neck of the condyle or the glenoid fossa? Do I make myself clear?

*Dr. Edwards.*—We cannot jump the bite with artificial teeth and make the patient comfortable even to the extent of getting them to wear the dentures. The natural functional movements of the mandible and the coordination of the arrangement of the teeth in perfect harmony is the key to stability.

Dr. Rupert Hall is credited with designing a prop in the shape of an adjustable screw that makes equal pressure in the central portion of the mandible and a balanced pressure in the central lingual area of the lower denture (showing model), which looks valuable for determining the first point of contact of a high cusp. This may be of some use to the orthodontist.

## CEMENTS, WITH A CONSIDERATION OF IMPORTANT DETAILS IN THE CEMENTATION OF ORTHODONTIC BANDS\*

BY DR. HARVEY A. STRYKER, SANTA ANA

THIS subject has been slightly changed to include a consideration of important details in cementation of orthodontic bands. Based on observation and experience it would seem that the foundation work incident to construction, adaptation and cementation of orthodontic bands presents a very important and timely issue.

It is the purpose of this essay to present the important facts associated with the care and manipulation of cements; preparation of the teeth for receiving orthodontic bands; and certain specific requirements which every anchor band should fulfill to comply with our present day conception of preventive measures.

There seems to be an evident need for greater standardization in the methods of procedure, to the end that the ultimate verdict of appraisal in the value of orthodontic treatment shall be manifested by greater cooperation and confidence between the orthodontist and his professional brothers.

The responsibility of the orthodontist is ever increasing, and that they are meeting this responsibility is evidenced by greater earnestness and efficiency in all phases of orthodontic practice. Our professional confrères, however, continue to challenge us with regard to the manner in which we safeguard the teeth and investing tissues.

### CEMENTS

For our mutual study and consideration we will first discuss cements and their proper manipulation. No attempt will be made to deal with intricate details associated with the chemistry of cements. While many claims are being made for different kinds of cements, a search of the literature on this subject reveals no material change of ideas for some years. The great majority of oxyphosphate cements employ phosphoric acid solutions as the liquid and zinc oxide as the base. The character of the hardened cement depends fundamentally upon the powder, while the working qualities are influenced to a large extent by the liquid.

Zinc acid phosphate is relatively insoluble in water. The only change which can occur after long service in the mouth is its conversion into a substance more insoluble than the original zinc acid phosphate. Zinc acid phosphate when mixed with water, its mother liquid, is a sticky, slimy mass which accounts for the desirable plasticity of freshly mixed dental cement.

When commercial zinc oxide and concentrated phosphoric acid are mixed together a reaction takes place instantly. Heat is evolved, the mass sets rap-

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idly and a porous, friable cement results. The problem in developing a satisfactory cement is to retard this reaction sufficiently so that time is given for proper manipulation before the mass hardens. The activity of the liquid can be changed by varying the amount of free phosphoric acid in it.

When the powder and liquid are turned over to the operator they represent an arrested chemical reaction, which the operator proceeds to complete when he uses the cement. The manufacturer has designed his cement to give certain desirable properties when it is handled in what he believes to be an average manner, under average conditions of temperature and humidity. The reaction rate is still to some extent in the hands of the operator.

Shrinkage in an oxyphosphate of zinc is the result of water being given off in the setting process, because the formula has contained water in excess of the amount necessary for proper crystallization, so that the mass, not taking on porosity, it must take on reduced peripheral measurements.

Expansion in an oxyphosphate of zinc is the result of water being taken up in the setting process, because the formula has not contained sufficient water to furnish the water of crystallization for proper setting, when, if water be accessible, it will be taken into the mass with the result of increased peripheral measurements. The setting of an oxyphosphate of zinc in the presence of aqueous moisture, with the taking up of a slight quantity of water, as water of crystallization, instead of giving up some of its acid to the surrounding aqueous moisture depends upon the modification of the acid by proper phosphates.

Thus shrinkage and expansion may be regulated in compounding a cement liquid by adjusting the proportion of water, having in mind that for most purposes a certain manipulation and consistency of mix will be recognized as proper. As our work with cements is almost entirely confined to the setting of bands fitted upon and around the sound teeth, an amount of expansion is both permissible and desirable.

The term "hydraulic," as ordinarily applied to cements, implies that the ingredients of a certain cement will harden even in the presence of a large excess of water. However, all oxyphosphate cements must have protection from moisture until the soluble acid phosphates have combined with more of the cement powder and have become fixed as insoluble phosphates. Unless sufficient time is given for this initial setting exposure to water or saliva will dissolve out a portion of the cementing agent, causing eventual disintegration.

The adhesive qualities in all oxyphosphate cements are largely due to the adaptation of the minute particles of the powder to any inequalities in the tooth surface. A cement must have strength and density to have the maximum adhesion.

Very little definite information is contained in dental literature on the subject of germicidal efficiency of dental cements. There seem to be two distinct classes of germicidal cements:

First, those in which the germicidal agent is the material from which the cement is made; i.e., black copper and red copper cements.

Second, those that are basically oxyphosphates of zinc to which a germicidal material has been added.



Since those of the first class produce discoloration their use is limited. While oxyphosphate of copper has been considerably used in cementing orthodontic bands, it has been observed that discoloration follows its use in those cases where the enamel is checked or the band is left in position for any considerable length of time. Properly mixed, this cement is the strongest and most resistant of all cements.

Those of the second class seem to have some points in their favor, such as greater stability and permanence of the cement body and little or no discoloration. The so-called "silver cements" come within this class, in which 2 per cent of silver chloride is incorporated with a 98 per cent zinc cement. One of our leading cement manufacturers recommends incorporating 1 per cent of mercuric oxide with his crown and bridge cement.

Germicidal cements should be used with great care and caution in cementing orthodontic bands. In the selection of a cement we should be guided by the properties of insolubility combined with proper adhesiveness. These properties are found in most high grade oxyphosphate cements.

#### MIXING TECHNIC

The first consideration in mixing cements is the equipment. The mixing slab should provide a generous surface, be of clear, hard glass about 1 by 3 by 6 inches, having beveled edges and carefully polished surfaces.

The next requirement is a broad, stiff, heavy spatula with a double knife edge, preferably noncorrodible. This spatula may be of coin silver or an alloy of silver and copper containing the proportions giving the maximum rigidity and hardness. Such a spatula might more readily be called a rubber or kneader, being quite rigid there is no chance of using it in the same manner as the flexible druggist's spatula. In using this type of spatula one is enabled to make the mix under uniform, hard pressure while manipulating it with a rotary motion.

For holding the cement liquid a glass bottle, having a telescoping glass cap, such as the S. S. White No. 6 office preparation bottle, serves the purpose very nicely. Within this bottle there should be one of the ordinary droppers for conveying the liquid to the slab.

Briefly, the completeness of the first incorporation of powder, the too rapid or too gradual addition of powder or too little or too much spatulation determines the efficiency of the mix. The powder may be divided into from two to five portions according to the size of the mix, the first portions of powder to be drawn into the liquid should be small and the spatulating should be continued until every grain of powder disappears in the mass. Spreading the mix thin by a rotary motion and covering all portions of the mix in the movement of the spatula will result in a uniform reaction with a very slight rise of temperature. When absolute smoothness is felt under the spatula then draw successive portions of powder and thoroughly spatulate each addition as described until the desired degree of plasticity and tackiness is reached.

The temperature of the slab is very important and it should always be chilled before mixing.

Mixing has an important effect upon durability. If mixing is continued too long the new compound will be deposited slowly and before a fluid-resistant mass is formed saliva may come into contact with the cement, penetrate and destroy it.

Good results cannot be obtained unless the powder and liquid are mixed together to a uniform mass. If in one portion there is some unmixed powder a chalky nonecohesive layer exists, which at best is a plane of mechanical weakness, and, if it appears on the surface, forms a weak point for the attack of the cement by the fluids of the mouth. If on the other hand there is some unmixed liquid in the cement, this also forms a plane of weakness if buried in the cement, or if near the surface will be dissolved in the saliva.

The majority of operators make the mistake of mixing cement too thin and too hurriedly, for the sake of gaining time. While this may be necessary with a cement that sets too quickly on the slab, it is obviously not necessary with a cement that sets more slowly on the slab. When more time for mixing is available, more powder may be incorporated in the mix, and this makes for greater strength and resistance to oral fluids. Most failures in cementation are either due to mixing too thinly or too hurriedly, or to the use of inferior cements.

There is little danger of mixing a zinc oxyphosphate cement too thick, because it would set before it could be properly placed in position, and the operator need only remove it and make another mix. If the cement is mixed too thin, then real damage is done, because the cement can be placed in position and the patient dismissed with the defective cement in place. A safe rule to follow for all cementing operations is to mix the cement as thickly as possible so that it may still be properly placed.

Absolute cleanliness is to be observed throughout the mixing, and careful avoidance of contamination of liquid or powder by keeping them stoppered and by pouring out the powder, and using the dropper for the liquid rather than using an instrument for taking them out. Obviously, when beginning a mix of cement the spatula and slab should be immaculately clean.

#### CARE OF THE LIQUID

The setting velocity of a cement depends upon the composition of the liquid. If this is changed the setting velocity will be affected. When cement liquid is exposed to the air, as by leaving the bottle uncovered, water evaporates and finally crystals are deposited. Liquid so treated is no longer of the composition carefully adjusted by the manufacturer to give the predetermined result with the powder. It is usually much slower setting.

With the ordinary container which is corked, with average handling, there will always be more or less liquid standing about the cork, exposed to the air, which will attract water from the atmosphere during summer months and in winter give up water to the atmosphere of an artificially heated room. In summer the diluted liquid passes into the bottle on each removal of the cork, altering the specific gravity to that extent, and in winter a crystal from about the cork may start crystallization in the main mass of liquid, which would probably have remained free of crystals if transferred to the other

form of bottle, with which this could not happen. In order to secure the best results the liquid should be carefully stored and kept tightly stoppered to prevent evaporation. When ready for use it should be transferred to a capped bottle as described under equipment.

#### TIME OF SETTING

All oxyphosphate cements must have protection from moisture until they reach the so-called "hydraulic" state, requiring an average of from two to four minutes. When the surplus cement left at any joint has progressed in setting to a leathery consistency it may be to advantage subjected to moisture, i.e., the saliva may be allowed to come in contact with this surplus, which in a few minutes will be sufficiently crisp to be removed in a few sections in a cleanly manner. The cement within the joint will then be far past being damaged by moisture, and should have moisture for complete and proper setting.

Most manufacturers supply three liquids, termed quick setting, medium setting, and slow setting. The selection of any one of these will take care of almost any requirement, although the medium setting will be found suitable for most operations. As before mentioned, the time of setting is also controlled by the time spent in mixing.

The lighter shades of cements give slightly quicker setting; the darker shades of powder are slower setting and are also of better grade.

#### PROPHYLAXIS OF TEETH TO RECEIVE ORTHODONTIC BANDS

Another important consideration tending toward greater security in our foundation work is that of thorough prophylaxis of teeth which are to receive orthodontic bands. Unless we take due cognizance of this important step in the cementing of orthodontic bands, dental caries may ensue with its damaging consequences.

Before instituting orthodontic treatment, the patient should be referred to a periodontist, or to the dentist, for thorough prophylaxis of all the teeth. In any event, the orthodontist should include prophylaxis of all individual teeth immediately before cementation of orthodontic bands.

The teeth should first be painted with a disclosing solution in order to reveal any deposits or checking in the enamel. The following formula for a disclosing solution, suggested by Dr. Julio Endleman, has proved very satisfactory:

Iodine		gr. 50
Potassium iodide		
Zinc iodide	aa	gr. 15
Glycerin		dr. 4
Aqua Dest.		dr. 8
Sig. Disclosing Solution.		

The teeth should then be polished with a wood point on a port-polisher using calcium phosphate. If one prefers to use the engine, rubber cups with

a right-angle hand-piece will be found satisfactory. For polishing the interproximal surfaces, flat dentotape should be used with calcium phosphate.

In lieu of calcium phosphate for polishing, an abrasive paste containing the following ingredients may be used:

Flower of Pumice and  
Carmo luster powder (equal parts)  
K-Y jelly to make a paste  
Lavoris to flavor

After polishing, the disclosing solution may again be applied if there is any question of doubt regarding the condition of the enamel surfaces. In cases of slight checking of the enamel it would seem to be better procedure to use a very fine sandpaper disk followed by polishing. The tooth to be banded is now isolated, using cotton rolls or some other absorbent media, after which the tooth is thoroughly washed with hydrogen peroxide. Just before cementing the band the tooth should be wiped with chloroform. Chloroform seems to be better for removing saliva than alcohol.

This raises the question of the condition of the enamel surfaces for receiving the cement. If we are to follow the instructions of cement manufacturers, then the surface to receive the cement should be slightly moist. It seems no more reasonable to expect to flow cement advantageously to a desiccated tooth surface than to flow plaster of Paris to the surface of a plaster impression which has not been properly moistened. The merest moistening of the enamel surfaces with the cement liquid, or distilled water, facilitates the flow of the cement to intimate contact with all inequalities, which insures greater adhesion.

The practice of using strong medicaments just previous to cementing the band, for the purpose of sterilizing the tooth structure, is somewhat questionable. It would seem more important to direct our attention to the proper manipulation of cements and to thorough prophylaxis of the enamel surfaces. Germicidal solutions, as applied to enamel surfaces, would seem to have but a temporary effect.

In those cases where enamel is defective, sterilization might be more permanently established by using a cement in which the germicidal agent is incorporated in the cement powder proper.

#### ESSENTIAL REQUIREMENTS INCIDENT TO CEMENTATION OF ANCHOR BANDS

There are certain fundamental steps in the construction and adaptation of anchor bands which are extremely important in further securing our foundation work.

In adapting anchor bands, the banding material should be allowed to extend slightly beyond the free margin of the gum, in order to preclude the possibility of formation of decalcifying chemicals at the gingival margin, and the disintegration of exposed cement, with resultant caries.

In the mandibular arch, festooning of bands should be carried from the mesiobuccal angle, thence lingually and around to the distobuccal angle, to prevent impingement on soft tissues. The gingival edge of the band should also be slightly contoured inward just previous to cementing. In this arch



also the buccoclusal edge of the band should be trimmed away sufficiently to avoid the opposing maxillary molars when the teeth are in occlusion. It is equally important that no portion of the anchor band should rest on the occlusal surface of the tooth. Disregard of this fact will result in spreading of the band material from occlusal stress with consequent disintegration of cement.

#### DISCUSSION

*Dr. F. W. Epley, San Francisco.*—I think that most of us remember the bitter and acrimonious discussions that were carried on a few years ago between the cement manufacturers. I received Dr. Stryker's paper this morning to look over, but since I knew the time would be short, I wrote to as many cement manufacturers as I could get the names of and asked for any literature they might have and these pamphlets are a small part of that which came.

I agree with Dr. Stryker that it is folly for dentists or orthodontists whose business is orthodontia to attempt very much in the way of chemical tests or to go into that subject. I think those discussions and debates that went on a few years ago put the cement manufacturers on their metal and the result has been that we have five, six or seven standard cements today, any one of which will serve its purpose very well. One writer said that there is no perfect cement, and that probably is the case.

Now since I taught and studied chemistry for a good many years, there are a few points along that line that appealed to me in the paper and also a few that I gathered from the literature and I will briefly run over those and close the discussion.

One author mentioned in some of the older literature that carbonates are often put into cement powder and he said that if we should ever detect an effervescence or bubbling of the cement mix as we are making it, discard it on the ground that carbonates are there, because even an amateur chemist knows that carbonates are very easily disintegrated by almost any acid whatsoever, except their own acid.

Dr. Stryker might almost have said his paper in one word, or one sentence—follow directions! I was addicted to photography for a good many years and it took me quite a long time to get that point through my head. I always thought that some young fellow from Pumpkin Center who had found a new developer might have a good deal better developer than Eastman who employed a half dozen high priced chemists. I found later that the maker of a plate or film knew what he was about when he said, "Please use my developer with my films, if you want best results."

One author said that proper adhesiveness is not best indicated by the performance of a cement on the slab, because a cement that adheres very strongly on the slab probably has a prolonged acid reaction and would better be discarded, and he said that the best test for this property is use in the mouth. Also, I might quote the chemist's test for the fineness of a powder. It is a very simple one—put some between your teeth and grate it around a little bit. If it feels very gritty, it is pretty coarse.

The question of what makes a cement adhesive is interesting. The composition or end product of cements, according to all the chemical authorities I could find, is still an open question. It is probably a mechanical mixture of zinc phosphate or zinc oxyphosphate and some uncombined zinc oxide.

The adhesiveness of a cement is due to minute interlocking crystals that thrust themselves into the microscopic unevennesses of the enamel and grasp them, on the same principle that when we wish to make one bit of plaster adhere to another, we scarify one of the surfaces and that gives additional hold for the cement.

How does over-spatulation injure cements? It breaks up these crystals that form an interlocking matrix, so that they lose that basketlike interweaving and probably that makes the mass less able to cling together or to seize upon the unevennesses in the enamel.

Sometimes too, we are tempted, when we run out of powder and have some liquid left, or run out of liquid and have some powder left, to say, "I will just use that liquid

or that powder with this liquid," using cement and liquid of two different manufacturers. That would be all right if the powders and the acids or liquids were invariably of the same composition, but they are not. The manufacturer compounds a liquid to suit his particular powder and there are a number of ingredients that enter into a cement powder. Therefore, it is not fair to him to interchange liquids and powders. It may give a tolerable result and it may not.

Why a smooth slab? Perhaps in your high school days you may have made a super-saturated liquid. I remember that was an experiment we used to make, carefully dissolving a chemical in water until we had what they called a super-saturated solution. We would perhaps do this at considerable temperature and then allow it to cool down and then suddenly drop a crystal of this chemical into this super-saturated solution and it would solidify almost at once. It is like standing a row of dominoes up and touching one and seeing the motion run through the whole row of dominoes. Somewhat the same thing occurs in chemistry. Metaphorically speaking, the trigger is pulled by using a rough slab which has creases in it and possibly a lingering crystal in one of those creases. Also, the crystal may be a chemical that does not belong there.

Why polish the tooth? In our haste sometimes perhaps we skip over that a little. If it is true that the crystals grasp the interstices in the chemical to hold on, and if the tooth has an organic plaque over its surfaces, as all teeth have, the crystals are separated from the enamel so that they cannot get hold, and so the grasp or sticking to the enamel does not take place.

I have had occasion to think a little about how to polish the interproximal spaces and I have tried what we call Irish linen. I think Barber's Irish linen, No. 12 is about the right size. One can saw it backwards and forward through these spaces. It is very absorbent of liquids. I doubt very much whether a paraffin strip would do the work. It would perhaps wax the tooth and make the cement hold less perfectly.

Why add powder slowly? There are a number of reasons for that. One is this: The phosphorous acid has three atoms of hydrogen that may be given up. The most active one and the most readily given up, is the first and that is the one that is neutralized first and causes the most heat. If that is neutralized first as Dr. Stryker said, by incorporating the powder a little at a time, the onrush of heat is got rid of and the mix will, according to one authority, allow the incorporation of at least twenty per cent more powder.

Now, sometimes when we take a band off we notice a disagreeable smell and the child remarks to you, "That doesn't taste very good." That is a bad sign. It may be due, of course, to a portion of the cement having broken out, dissolved out, or it may be due to one of these spongy mixes which you may get by the thin mix of which Dr. Stryker spoke. We will get a much finer cement by incorporating the powder slowly and getting in that extra twenty per cent.

I might note this that since there is considerable acid, probably free acid, for some time after the cement is mixed, the slab is much more easily cleaned by treating it with a strong soap or sodium carbonate or some other alkali which will neutralize the acid.

Another point that occurred to me was the treatment of the band once worn. We may clean the tooth when we prepare to recement a band very nicely with cups or pumice or chalk or tooth paste or whatever we choose, but are we sure the band once worn has not a coating of organic material on the inside? I think we will find if we heat that band over a burner, that there will be an effusion of smoke and bad odors, showing that the band is coated on the inside.

I have found this point too. When I am tempted to look into a child's mouth and say, "You are all right; just run on and come back in two weeks"; then I try to put myself in the father's place when he asks, "What did he do to you today, Johnny?" "Looked in my mouth and told me to go along," and father begins to figure, "How much did I pay him for that look?" It sometimes makes disgruntled patrons. I do not blame them. I have formed a habit of no matter how sure I am that an appliance is all right, of taking an explorer and running around the edges of the cement and underneath the edge of the band, if I can. It is surprising how many times one finds them loose.

The final point, which interests me very much, is the matter of the staining of teeth. I have thought and read extensively about antiseptic cements and have tried using copper cements and mixing them with other cements, and I found evidence of stain. Then, as I have read the literature, I have found that some of the colors of cements are produced by incorporating oxides of other metals with the zinc oxide. Iron oxide is one that is used to darken a cement. Now every geologist knows that the great colorer of nature is iron and I apprehend that the closer we cling to light color cement and keep bands well cemented on, the happier we shall be.

*Dr. Chas. Mann, Seattle.*—I would like to thank Dr. Stryker for bringing the subject before us in such an interesting way, and to compliment Dr. Epley for the points he has brought out. They seem to be routine procedures in practice and in these meetings small things to consider, but I think that Dr. Stryker and Dr. Epley have done us much good today.

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### ORTHODONTICS AND COMMON SENSE\*

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BY WM. RUSHTON, L.D.S., LONDON, ENGLAND

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HAVING been requested by your Honorary Secretary to read a paper before this society, of which I have the honor of being one of the founders, I have much pleasure in complying with his wish.

In 1914 I read a paper before the sixth International Dental Congress, held in London, entitled "A Criticism on the 'New School' of Orthodontics," in which I endeavored to show that the claims made for the new school were in many cases unreasonable, and advocated dealing with dental irregularities in a rational manner, whether by extraction or expansion or a combination of both. I pleaded that each case should be judged on its merits and no hard and fast dogma should be placed as a burden on the back of the practitioner. Since that time I am more than ever confirmed in my views and these views I shall repeat in certain parts of this paper. I showed that the theory of the new school rested on the ideal of perfect natural occlusion—the full complement of teeth in normal relations. To extract a tooth was in their view to practice mutilation—an offensive term as well as an incorrect one—one might just as well describe as mutilation the removal of the appendix or tonsil—and the practitioner who extracted a tooth for regulation purposes was branded as an "odontocide." We may smile at this sort of thing, but it has undoubtedly influenced many practitioners by persuading them that such extractions were morally wrong, amounting to malpraxis. The only justifiable practice in their view was so to enlarge the alveolar arch that space would be made for the full complement of teeth.

The argument of the American school, I take it, is as follows: Nature has endowed mankind with sixteen maxillary, and the same number of mandibular, teeth which interlock in a particular way. They say that it is our duty to preserve these thirty-two teeth at all costs, and not only to preserve them but to take such measures that all the cusps interdigitate in the correct manner.

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Now, it is true that nature has provided man, at the present stage of the world's evolution, with thirty-two teeth. We are told that in the remote past the number of teeth was greater. How do we know that the process which has eliminated some of those teeth and diminished the size of the jaws is not still going on? We have certain reasons to suppose that it is. Jaws are growing smaller and the third molar has commonly too little room to erupt. The mandible especially seems inclined to diminish in size, and so frequently does this occur that many are of opinion that this condition may have to be accepted as a normal one. Mr. Norman Bennett has said, "I am inclined to think that the time will come when it will be accepted that the jaws of civilized man are no longer capable in many cases of holding the full complement of teeth, and that the extraction of four first premolars before or after eruption will be a common operation. There can be little doubt that inferior retrusion is becoming more frequent and that the mandible is diminishing in size at a greater rate than any other part. It is possible that postnormal occlusion of the mandibular arch to the extent of one unit will come to be accepted almost as a variety of the normal and as being not less beautiful."

How rapidly the jaws may diminish in a comparatively few generations is shown by the condition of the jaws of the American negroes, in which people the jaws, in a matter of 300 years, have altered from the prognathous condition of their forefathers to one approximating the white standard. Therefore when we are told nature intends us to have thirty-two teeth, I ask why does she not find room for them? We know something of nature's working in the past and the present, but her "intentions" are unknown. We can only take her as we find her, and tackle her problems as best we can.

As regards the second point, that of function being adequate only when the articulation is normal, I ask for proof. I know of a large number of cases in which function is perfect under abnormal conditions, not only in the case of the postnormal bite aforesaid but also in cases of regulation by extraction.

The American school, having started from what I consider an untenable premiss, have followed up their theories with logical precision, and by their industry and enthusiasm have carried away many of the dentists all over the world, so that to differ from their standard is tantamount to acknowledging oneself hopelessly antiquated. The consequence is that children are wearing complicated appliances, which may do the teeth and gums great harm, for a long period at a great expense, when, in a great many cases all these evils could be avoided. Such practice can only be excused on the plea that it is the only proper treatment. We do not, like the physicians, swear the Hippocratic oath, solemnly affirming that we will always place our patient's welfare before our own interests, but I have no doubt we have a desire to do what we consider best for those under our care.

Are we doing our best when we condemn a child to long years of treatment when by extraction we can simplify the case? The keynote of the American system is occlusion; correct occlusion must be obtained at all costs or dreadful things will happen. Dr. Angle says: "In proportion as malocclusion exists the functions of the teeth and speech are impaired and the



facial lines marred." This is by no means always the rule. We meet with cases when the occlusion is normal but the facial lines are marred by the arches being too narrow and the front teeth consequently too prominent. On the other hand, we often see cases in which malocclusion exists where the facial lines are harmonious and beautiful, so that Dr. Angle's statement that "the effect of malocclusion upon the facial lines is always to disturb their balance and harmony, and this in direct proportion to the extent of the malocclusion," though sometimes true, is by no means always borne out by facts. In my opinion Dr. Angle confuses cause and effect; the cause of the deformity may be varied, such as mouth-breathing, thumb-sucking, traumatic injury, etc., and one of the effects of these may or may not be malocclusion. The greater the maldevelopment or deformity of the facial bones, the greater will be the probability of malocclusion, which is only one incident in the general malformation.

The function of teeth is, chiefly, to masticate food, and I maintain that any set of teeth which is regular enough to maintain facial beauty and to masticate food efficiently is all that the orthodontist need attain. I acknowledge that many cases can be treated without extraction and without disturbance of the articulation. With these I am not concerned tonight.

In my opinion, the practitioner, unfettered by any inflexible dogma, should be free to choose any method by which he may obtain facial beauty and functional efficiency by the most rapid and hygienic method at his disposal.

When I read my paper in 1914, I was a voice crying in the wilderness, although I must not forget that Frank Colyer had already published a book on the regulation of teeth, in which judicious extraction was advocated. To-day other voices are also raised in protest, notably that of Mr. Steadman in a paper read before this society last December, entitled "Orthodontics for the Masses," with most of which I heartily agree, especially with that part of it in which he said: "I wish to make it clear that in some of these cases extraction is in my opinion the best treatment apart from economy." With him, I do not accept the proposition that the proper method is by nonextraction and that treatment by extraction is only a convenient second best. We consider that in many cases treatment by extraction with or without a subsequent appliance, is the proper method.

Mr. Steadman's paper, written for a special purpose, does not mention subsequent treatment by an appliance, but I am sure he agrees with me that in a certain proportion of cases an appliance must be worn to obtain satisfactory results.

The charges I bring against the American system are that it is often long and tedious, often injurious to the teeth and mouth, often ineffective and often expensive.

1. In nonextraction, appliances require to be worn in many cases for a number of years and the visits to the dentist have to be frequent.

2. I have seen many cases in which the prolonged wearing of fixed appliances has resulted in the destruction of the enamel producing permanent

disfiguring of the teeth. To what extent this is caused by faulty technic I am not prepared to say, but that it frequently occurs is beyond question.

3. Injury to the gums is no less certain. This can be caused by either fixed or removable appliances and, in my opinion, if regulation can be attained without any apparatus whatever (and by extraction this can frequently be done) it is the best thing for the patient. If an appliance has to be worn a removable one does less harm than a fixed one, and where extraction has been resorted to, the apparatus is worn for a much shorter period both for regulation and retention.

In this connection I will quote Dr. Stanley Coyler, the radiologist, who, in his recently published book on *Chronic Infection of the Jaws*, says: "I am much impressed by the damage that the forcible regulation of the teeth of children may bring about in their jaws. Sir Frank Colyer has taught this for many years, and radiology most certainly fully confirms his views. In one case only which I can call to mind there was no demonstrable change; in all others there was clear radiographic evidence of varying degrees of damage. In the worst form there is absorption of the apices of some or all the teeth regulated, together with a general infection of the supporting tissues. In less severe cases the infection is more localized, and sometimes partly cured, whilst in others it is possible that the repaired tissues may not have been infected. Some of the ill-effects of regulation appear to be due to the gingivitis set up by the regulating apparatus, whether this be of the 'fixed' or 'removable' variety. There are persons who take a light view of this gingivitis, considering it a temporary thing that can easily be dealt with when the other treatment of the case is complete. It is more than probable that this view is wrong, and that the gingivitis leads to an infection of the deeper tissues from which the patient may never recover. More damage, however, is probably done by the actual movement of the root of the tooth through the bony tissues, whereby their resistance is lowered and the way opened up for their infection. Further; it must not be forgotten that many of the children who undergo such treatment are often of a feeble constitution, some are the subjects of old rickets, others of tonsils and adenoids, whilst many—and this is most important—are affected with a marginal gingivitis even before the commencement of treatment. I am quite certain of my evidence when I say that the forcible regulation of children's teeth may lead to most disastrous consequences, and from a radiologist's point of view I unhesitatingly condemn the method."

4. The expansion method is often ineffective, and few of us have escaped seeing cases in which the teeth have more or less reverted to their old positions even when retention apparatus has been worn for a long time. The reason is that the teeth have not been reduced to a state of permanent equilibrium. This equilibrium has a much better chance of being established when, by extraction, sufficient room for the teeth has been procured.

5. The question of expense is sometimes a very important one. It has been gone into with considerable detail by Mr. Steadman in the paper re-

ferred to, and I do not propose to discuss it. I will only say that the laborer is worthy of his hire, and if we are honestly convinced that extraction is wrong we must solve the difficulty, if it arises, as best we may. If, however, we feel that extraction is right, we have the gratification of carrying out our treatment in our own way to the benefit of the child at a moderate cost to the parents.

In conclusion, I will refer to some interesting statements made by Mr. A. C. Lockett, Secretary to the European Orthodontological Society, in a paper read before that society in May, 1925. That society is, I believe, chiefly composed of American practitioners, and Mr. Lockett himself has studied in America. The paper is entitled "A comparative study of three American textbooks on orthodontia by Angle, Dewey and McCoy, with special reference to finality in orthodontics." Mr. Lockett, who writes in a vigorous style, is by no means satisfied with the teaching of the American school. He is convinced that there is in their minds a great deal which ought to see the daylight, and which up to the present has been kept in painful secrecy. He asserts that an honest confession and statement of these secrets will do more for the practice of orthodontics than "an apparent atmosphere of continued bluff and make-believe." After some very severe strictures on the writings of his three authors, Mr. Lockett comes to certain conclusions "in the light of British experience and conditions," which seem to show that the permanence of treated cases claimed by many American authors is not as common as one would expect to find, in fact is a "gigantic gamble"; that treatment by expansion is often unsatisfactory to the parents from an esthetic point of view; that school conditions in England are totally different from those in America and the question of remuneration with modern conditions in England has to be faced. He suggests that a book should be compiled showing results obtaining in cases supposed to have been finished five, seven or ten years earlier, and prophesies if that book ever sees the light it will be "an eye opener."

I shall now show some slides of cases treated by the extraction method, and you can judge for yourselves whether, after a considerable period, the results are satisfactory or not.

The conclusions I have arrived at are:

Prevent the necessity of regulation by impressing upon parents the importance of mastication and of nose breathing; warn them of the signs of nasal obstruction and of the dangers connected with adenoids and the tonsils.

If the teeth are fairly regular and the features pleasing do not regulate on account of the occlusion not being quite normal.

When regulation can be accomplished by extraction only, do not use any appliance whatever.

If for any cause it is considered advisable to extract the first permanent molars one need not hesitate to do so before the second molars are erupted.

Use removable appliances and insist that they be worn and kept clean.



FIG. 1.—Models of a girl aged ten and one-half years, where there was postnormal articulation. She was a lip-biter. The model eighteen years later was also shown. It could be seen that the first premolars had been extracted; there was not normal articulation, but there was a good functional bite, and she had been made into a good-looking girl. The case took one and one-half years.

FIG. 2.—Shows the girl before and after treatment. In the first she was drawing her lips together to hide her teeth, which were very prominent; in the second, after eighteen years, a very pleasing result could be seen.

FIG. 3.—The case of a girl aged eleven years who was a thumb-sucker. It could be seen how the mandibular incisors bit against the maxillary incisors. He extracted the two mandibular first premolars and brought in the mandibular incisors sufficiently to allow him to work on the maxillary incisors. Subsequently he extracted the maxillary first premolars and brought back the maxillary front teeth. Regulation took one year. The model thirteen years later was given; he did not say that it was absolutely perfect, but it was a very good result from the point of view of regularity of the teeth and of function.

FIG. 4.—The girl before and after treatment.

FIG. 5.—A delicate boy. It could be seen how very undeveloped the mandible was. That of course had to be expanded, which was done with a Badecock screw-plate. Subsequently the maxillary was expanded. The later models showed how the case had improved, but unfortunately the case was never finally completed, as the little chap died of pneumonia. This case took a very much longer time—about three years. He first expanded the mandible, put in a retention plate, and started expanding the maxilla, afterwards extracting the two maxillary fours and the mandibular left lateral. It was very crowded in the mandible.



Fig. 6.—Photograph of above case was a snapshot; it is not a very good slide, but the marked difference in the boy could be seen.

Fig. 7.—A girl of eleven years and four months who had had her tonsils removed. She had also been a thumb-sucker. She had been bottle-fed, but he did not attach any importance to that, provided she had been properly fed. Some of the best teeth he had ever seen were of children who had been bottle-fed. The reason he thought it was wise a child should be breast-fed was that it had a better chance of getting clean food. The bottle was often improperly cleansed from one feed to another, so that the child was therefore being continually poisoned. He extracted the maxillary fours and brought back the fronts—that took one year. He was quite satisfied that the second model fourteen years later showed a good result.

Fig. 8.—The girl before and after treatment.

Fig. 9.—Another similar case. The teeth were pinched in and prominent. The difference after treatment could be seen.

Fig. 10.—A case in which there was considerable space between the superior incisors. Some little time before starting the articulation of the case he brought the incisors together, then extracted the maxillary fives. Sometimes he extracted fours, sometimes fives, it depended upon several factors which had to be taken into consideration. He did not think it made a great amount of difference which were extracted, but if there was any likelihood of a space being left, although it took a little longer, it was sometimes wiser to take out the fives



rather than the fours. The case shown was one where, for some reason, he took out the fives. The articulation took one year. The model seventeen years later was given.

Fig. 11.—The author had resolved to do this case by expansion, for which he thought it was suitable. After he had expanded, to his horror and dismay he found that the canines came down outside and he was sorry he had not extracted in the first instance. Of course, afterward he extracted (4 on one side and 5 on the other) and after three years finished the case. The models ten years later after completion could be seen.

Figs. 12 and 12-A.—The girl had a crowded maxilla and mandible. The two maxillary fours were extracted and the mandibular fronts brought back. After that she went to another part of the kingdom, and another practitioner treated the maxilla by expansion. A year later she came back as bad as ever, and he then extracted the maxillary fives. The second slide shows four years after completion.

Fig. 12-B.—Shows the girl.

Fig. 13.—No history of adenoids or tonsils could account for this. Treated it by expansion. It took two years, and the model shown was taken nine years after it was finished. The centrals were now working a little forward, and he hoped it was not going to get worse.

Fig. 14.—The girl before and after treatment. It could be seen what very prominent teeth she had had.

Fig. 15.—Case of a child that had been operated upon for adenoids. She had a very crowded mouth with very prominent mandibular canines, so he took them out, and had never regretted it. The case took two years. The model was taken eighteen years after the regulation was completed.

FIG. 16.—This was a case of extraction only, and no other treatment. The two maxillary fives were extracted and the teeth came down pretty regularly. The bite was not perfect but was good enough.

FIG. 17.—A case still going on. Last April the author extracted the four fours. The girl had now gone abroad for a year, and he would be very surprised if, when she came back, the bite had not arranged itself, or very nearly so. In a case like that, a child could go away, and there was no trouble—she could enjoy herself, her teeth would go on just the same. There were no visits to the dentist, no plate or appliance to keep clean, no risk. It had manifold advantages.

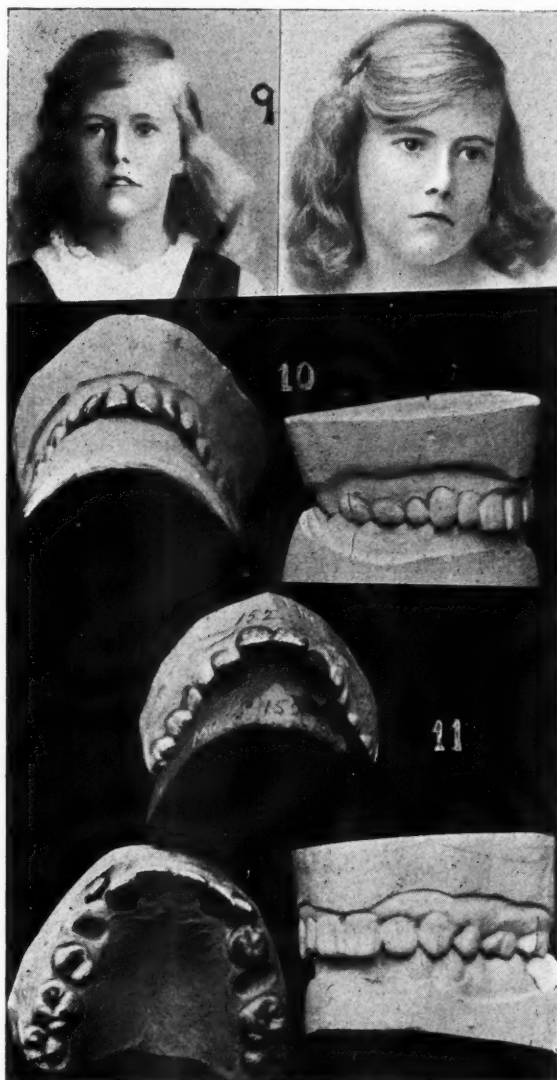


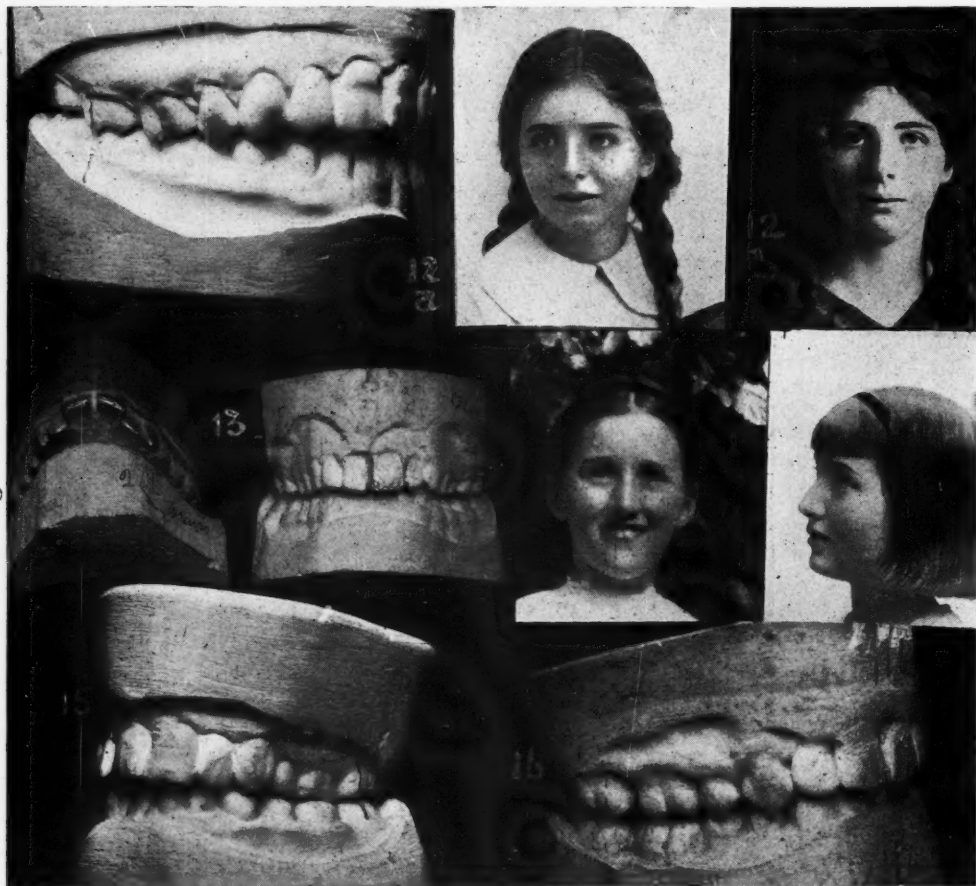
FIG. 18.—A girl with absence of one permanent lateral, the other being small. He extracted the latter and brought the canines forward. He was working on the other teeth to fill up the gaps, which no doubt would have been done, but the child died.

FIG. 19.—Here was one of those cases mentioned by Mr. Norman Bennett, viz., a natural postnormal one. He had done nothing to that, as he did not think it was called for. She had got a functional bite, and the teeth were fairly regular. His conclusion was to leave her alone.

FIG. 20.—Recent photo of the girl.

FIG. 21.—A case which showed that he was a man of very weak character! He felt it his duty to extract the two maxillary first premolars, but the mother strongly objected. There was an outstanding first premolar, and she said she only wanted that tooth extracted. He was weak enough to give way, but they could see the result, which however would only be detected by an expert. There it was, however, and it was not pleasant; it was lop-sided. If he had taken out the two premolars those teeth would have become very regular and would have been a pleasure instead of a disappointment.

FIG. 22.—Beware of laterals—they were very curious things. Here was a case which came to him when he was first in practice, and he went round to several of his orthodontic friends and they told him to get those laterals back and nature would effect a cure. Nature



does not effect those cures. He always looked upon laterals with very great suspicion. The canines were quite honest, straightforward fellows compared with the laterals. He brought those back, but somehow or other the boy went away, or did not wear his appliance, and those teeth went back again just as badly as ever. By the time he had cut his wisdom teeth they were worse than ever. If a premolar had been extracted on either side all would have been well.

FIG. 23.—A case in which extraction was absolutely asked for. In cases like this they might be quite sure that they got the quickest and best results by judicious extraction. The case was also shown more or less completed. He extracted the right mandibular lateral and the two mandibular premolars.

FIG. 24.—Here was an extraordinary case. It was not one of his, although he had taken the model of it because it struck him as being so extraordinary. He could not find out exactly what had happened, but he had brought it to show how teeth would travel. In the

maxilla the molars were up against the canines. She was quite a good-looking girl, and no layman would have known she had had any teeth out. He thought it would be interesting to let them see what had taken place and how spaces would fill up in the most wonderful way.

FIG. 25.—The girl was twelve and three-fourths years of age. Nine years previously he extracted the mandibular incisor and two maxillary fives. The case was progressing very nicely when the girl went to live elsewhere. A few weeks ago she came back again, and a model taken of her mandible showed that the mandibular incisors were even more irregular than they were when he had taken out the incisor years ago. Evidently the same force which caused the crowding in the first instance had persisted.

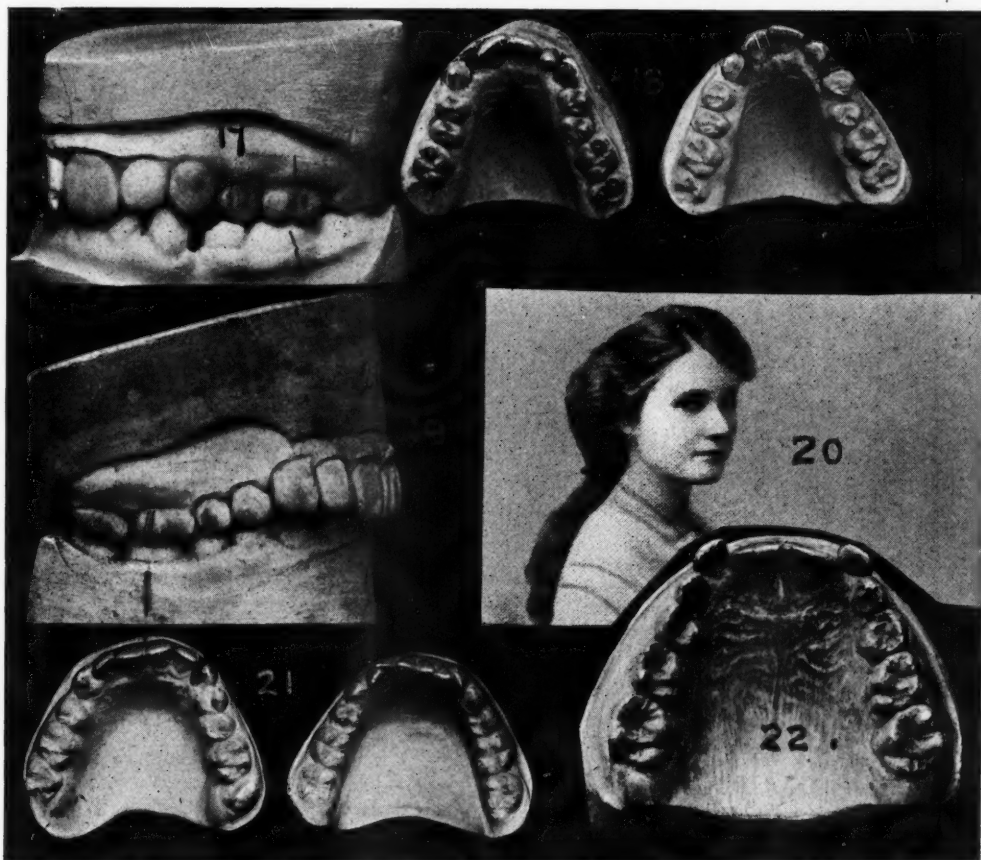


FIG. 26.—A patient of his had come to him after she had had a regulation done by expansion. She had now worn a retention plate for thirty years to retain a refractory incisor, and he had that day made a new one and put it in. She was forty-six years of age, and had worn a retention plate, chiefly at night, solidly all through that time—was it not pathetic? A little extraction at the proper age would have made it unnecessary.

FIG. 27.—They now came to the vexed question of the extraction of the six-year molar, a proceeding which has been "utterly condemned" by Hubert Visick and others. This was one of the first cases he had undertaken. He had extracted the decayed six-year molars thirty-three years ago and brought back the anterior teeth. The model shown was taken not very long ago.

FIG. 28.—In this case the six-year molars had been extracted by Quinby, of Liverpool, over thirty years ago. It was perhaps not as good an articulation as the one he had just shown, but it was not a bad one. It had served its owner well, and the mouth was clean and healthy.





FIG. 34.—Another case of Dr. Angle's. Here was evidently an underhung jaw. If he had extracted and brought mandibular teeth back he would have made a better job of it.

FIG. 35.—Another case of Angle's, in which both the maxilla and the mandible were too prominent. He considered that if extraction had taken place and both the maxilla and mandible had been brought back they would have obtained a much more pleasing result.

I wish to express my thanks to Mr. W. P. Lovelace, of the Dental Manufacturing Co., Ltd., for the excellent photographs and lantern slides.



#### DISCUSSION

*The Chairman* said that the applause of the members showed their very deep appreciation of Mr. Rushton's paper.

*Mr. Lockett* said: "The attitude of American schools of thought in orthodontics, so far as I know, happens to be more or less an agreed theory that the normal occlusion of all the teeth should be the ideal standard which all orthodontists should strive for. I was trained in that school of thought; as an ideal I took no objection to it provided I was satisfied that the application of the ideal in practice gave universal results of a permanently satisfactory nature in adult life. I am satisfied that the past quarter of a century has proved that this ideal is capable of practical application in certain types of cases treated under favorable conditions, and that in others it is not. I believe that in a very large majority of cases of all types it is possible to put thirty-two teeth in normal occlusion simply as a feat of skill, and that some cases will remain in normal occlusion for many years, and that others will be in normal occlusion for a short time only. My feeling on this subject of ideals as against results is that it is the duty of an orthodontist to his patient to put the ideal into practice where he is satisfied that in doing so the best interests of the patient can be served thereby, and to depart from that ideal if convinced that the best interests of the

patient will not and cannot be served by the application of an ideal principle. It is to a large extent a matter of individual responsibility of a man to his patients. I feel that Mr. Rushton's honest intentions will become something in the form of a reality when he has satisfactorily proved to the profession that extraction for a large number of cases is in the best interests of orthodontic study and practice; but that will take some doing. My comment on the paper is that there is a tendency on the part of the essayist to be extreme and to err in that respect, in just the same way as the idealist is extreme in his belief that anyone who disbelieves or departs from the ideal is wrong. The day is coming, and we shall see abundant evidence of proof in the next six years, when a reasonable compromise will be the generally accepted principle on which orthodontics will be practised and on which it will prosper, and be the guiding principle which will give the patient a fair chance of permanent and lasting results in adult life. It will be possible, I hope, under this principle to bring the benefit of orthodontic treatment to the children of 10 per cent of the population of these islands, and all my efforts in the past four years in writing or speaking have pointed to this fond hope. I should be very proud to think that any of my efforts in this direction would be of some help to the movement 'Orthodontics for the Masses.' It is a great movement and worthy of support and sympathy, but it is so vast that I ran away from it and was satisfied with a 10 per cent portion of the population as my portion of consideration."

Speaking in a general way of the models that had been shown them that night, there was no question that the results had been brought about through extraction, and they enabled Mr. Rushton to present photographs of his patients which looked satisfactory in some respects. He thought, however, that the question of extraction of teeth in connection with the treatment of cases was a matter for very serious consideration before entering upon it. Speaking from his own experience, and after discussing it with one or two other men who had adopted somewhat the same attitude in America, his opinion was that they might find later, as years went by, that perhaps now they might be extracting (even in such cases as Mr. Rushton had presented) the wrong teeth, and they might have got better results by extracting others. He was speaking in a general way only. He agreed with everything Mr. Visick had said in a paper on cases of extraction of first molars. All those evils that he had mentioned could occur sooner or later—perhaps not in the same mouth, but in different mouths. If the first molar had to be removed at any time for any cause, or if anybody wanted to remove it for orthodontic treatment, if it was done just a year or six months before the eruption of the second molar, the second molar would go forward in a vertical position, and retain that position, such as the slide had shown. He thought they ought to get better results than had been shown, although some of the cases were not bad. He thought that half of them were fair; in the others, the position of the teeth might have been improved. The articulation might have been improved if there had been a little bit more exercise of mechanical thought put into the case. He believed that there were cases on record where it might be possible to bring about results by extraction in simple cases without treatment, but he deprecated the idea that they were going to treat cases by extraction only as a fixed rule, but he had not sufficient experience on that line to say much.

Mr. Jameson asked Mr. Rushton if he would tell them what sort of plates he used for the regulation of those cases; his experience was that all plates were more often in the children's pockets than in their mouths.

The Chairman (Mr. Cale-Matthews) said that it was a mistake to think he was opposed to extraction at any price. He had only returned from Portsmouth that day, and in the morning one or two men, in considering a very marked case in which treatment by extraction was obvious if ever he had seen one, turned to him with the greatest surprise and said, "Fancy you advising extraction." When he was a student the extraction of the permanent molars was the orthodox routine treatment, whether there was overcrowding or not! There was a little word that crept in occasionally in Mr. Rushton's paper that was almost negligible but which, on careful reading, he thought would very largely qualify a great many of his apparently wide statements. He would ask those who would be reading the paper when it was published just to look for those little words. He had noticed

them and they were qualifications to broad statements—not one of them could help putting in those little words, perhaps for their own protection in the future, when they were writing or reading a paper. He did not accuse Mr. Rushton of side-tracking or wishing to save himself from any criticism in the future, because he had the courage of his convictions—he knew what his opinions were. With regard to the photographs, he had noticed that the first was frequently an amateur one, whereas the second was a professionally retouched one. That was one of the great difficulties they had, unless they had their own cameras in their surgeries, of getting true photographs of cases both before and after treatment. He would ask Mr. Rushton frankly whether there was not in every one of those photographs of the adult or child after a long period a marked contraction of the nose, a strained look about the lips, when extraction had been resorted to. There was another thing—extraction of two teeth in either jaw might mean that they had more movement of the remaining teeth than the placing of the teeth in the proper position without extraction implied. That was a point which he did not think was often borne in mind by people who would not wear an appliance under any circumstances. It was an appallingly large subject, and he thought that Mr. Lockett had placed the matter fairly straightforwardly when he said that idealism was the thing to teach, practice it where they could, and that they must take the best out of both methods. For his own part, when it came to a case of partial treatment by extraction, it afforded him considerably more anxiety than the most complicated treatment by mechanical appliances. Take, for instance, the case where the mandibular incisor was extracted and the ultimate crowding was greater than before that tooth was removed. He personally thanked Mr. Rushton for what he had said that evening.

Mr. Maxwell Stephens said a paper of that description was apt to make a little confusion in the minds of those who were starting practice. It should not, however, prevent their taking up a consideration of the subject from as wide an angle as they possibly could. They should not allow that paper to let them get lazy without having thought of the possibilities of other treatment. They should consider adequately everything from the papers that were read there on different methods employed by various practitioners.

Mr. G. Northcroft said he had always held that they must treat every case on its own merits. They could not dogmatize about the treatment of any class of case, but they must work according to their patients' features and circumstances. By the latter he meant their school attendances, their parentage, hereditary factors, and a thousand and one things that occurred in considering the lines of treatment they had to adopt for each individual case. He very heartily endorsed what Mr. Maxwell Stephens said, that they should not, when listening to any papers delivered in that room, run away with the idea that what they heard was by any means final or the only word that could be said on the matter.

Mr. Bertram Samuel said that one of his first professional acquisitions after the war was the volume of *Transactions* of the 1914 International Dental Congress. It was the reading of the section on orthodontics that first really interested him in the subject. Mr. Rushton might recall the evening when they discussed his paper, which was one of the most interesting items in that section. He thought they should remember that a great deal of water had flowed under London Bridge (or Brooklyn Bridge, for that matter) since 1914. Mr. Rushton's original paper made reference to the American school, by which he understood those practitioners who affirmed that extraction had no place in the rational treatment of orthodontic conditions. He had read a mass of orthodontic literature, emanating both from America and this side, and he thought it would be generally conceded that such a standpoint was no longer taken, and that the majority of serious practitioners in both countries did practice common sense, and that the policy of extraction had its place in all their minds nowadays. There was one other point to which Mr. Rushton referred. He mentioned a paper written by Mr. Norman Bennett, in which Mr. Bennett spoke of the English facial characteristics, in that there was rather a tendency toward a certain type. Many of the cases illustrated and criticized by Mr. Rushton were types that were given to the public



by Dr. Angle in his book some thirty years ago, and of course he supposed they could not consider those to be British or English types. He would like to thank Mr. Rushton for his paper.

*Mr. Pitts* was in sympathy with a great deal that Mr. Rushton had said. He thought it was a very timely, courageous and common-sense paper; it seemed to him that "extraction versus some other method" was a great fallacy. They should use whatever appliance might be best suited for the purpose, even if it happened to be a pair of forceps, and frequently the best results were to be obtained by a combination of both. There he was in sympathy with Mr. Rushton, for he found that in an earlier paper by Mr. Steadman too much reliance had been placed upon forceps alone, and he thought then that some of the results were poor. He thought that extraction plus other treatment admirable in a very large number of cases. He saw a case not very long ago of a girl with a very marked degree of superior protrusion. The first premolars were extracted and the case left, but a year later the second premolars had moved up in contact with the canines. The extraction had been absolutely wasted and some further extraction was going to be needed in order to remedy the case. There was the result of an attempt to treat the case simply as one of extraction. He noticed that Mr. Rushton described several cases of postnormal occlusion, where he had carried out extraction in the maxilla without any treatment of the mandible. According to the photographs, the chin appeared to be quite well formed as far as one could see. But in so many cases of postnormal occlusion the mandible was very undeveloped. What did Mr. Rushton do in those cases? It did not seem to him that one was going to get the best result from treating the maxilla only, if one left that underdeveloped mandible where it was. His own practice was to make the facial profile the deciding factor. If the chin appeared to be reasonably good, he ignored the postnormal occlusion. He considered that it was a good working occlusion which enabled a child to masticate any kind of food perfectly well, but if the mandible was badly developed, then it seemed to him that something ought to be done. He would like to know from Mr. Rushton what he did in that case. He had always felt any case of postnormal occlusion which called for extraction of mandibular premolars must be excessively rare. With regard to what Mr. Rushton said about first permanent molars he did not feel a great deal of sympathy. What was badly needed was the record of some hundred cases of extraction of first permanent molars, with models taken in later life and adequate history of exactly when extraction took place and the relationship to the eruption of the second molars. Then they would be in a position to know what results followed and the factors deciding them. He could not think that all the bad cases he had seen had been due to extraction of the first permanent molar having been done after the eruption of the second molar. He took it that nobody present had any sympathy with the view, which was prevalent when he was a student, that extraction of these teeth was a valuable treatment for malocclusion. As Mr. Cale-Matthews had said, extraction of the first molar was the routine treatment quite irrespective of its condition. He would like to thank Mr. Rushton for his admirable paper.

*Mr. Rushton*, in reply, observed that he had expected to be cursed like the gentleman in Scripture, but they seemed to have blessed him altogether, or very nearly so! He had simply shown them what he had done in certain cases in his own practice, and they must draw their own conclusions. He used removable plates in nearly all cases. He quite agreed with Mr. Northcroft that the ideal was (as he had said in the beginning of his paper) to take each case on its own individual merits. He did not go perhaps so deeply into the various factors in connection with a case as Mr. Northcroft did sometimes, as regards previous health, heredity, disposition, etc. Undoubtedly they were all very valuable in their way, but he took a case as he found it, and carried it through to the best of his ability, in what he considered the best interests of the patient. That was as far as he could go, and from the remarks that had fallen from the gentlemen who had been kind enough to discuss the paper, they were all very much in harmony on that point. Using the word "harmony," he agreed again with Mr. Northcroft that harmony was the thing they must strive to obtain by the best means in their power. As regards the photos, some were amateur, some professional; he did not ask for them to be professional, but as a rule when the mother saw

her child restored to beauty once more she was only too delighted to present him with a professional photo, and it was a very nice thing to keep. He advised them all, when they had cases, to take, or have taken, photos before and after. Apart from any professional prestige, it was a very pleasant thing to feel that you were an artist creating beauty, and that your artistic work was appreciated. As regards the six-year molar, the thing was that if it were extracted it should be done at the right time, not as a routine practice as old practitioners did. Mr. Pitts had asked what he would do in extreme cases of receding chin. Honestly, he had had no cases; at least, he could only remember one, and he had left it alone; he wished somebody else to take it on. He felt he could not do anything worth doing without destroying the harmony of the rest of the features. It seemed to him that it was one of the most difficult things in orthodontics to make a chin when there was not one. He would like a paper read on that point by those people who had done it. He thanked those present very much for the patience with which they had listened to him, though they might not all agree with him. As orthodontists they had a great many opportunities of being very useful and helpful to their fellow citizens. He thanked them very much indeed.

## Clinics

### PREDETERMINED DYNAMIC ACTION OF A MANDIBULAR ARCH APPLIANCE\*

BY HENRY C. FERRIS, D.D.S., NEW YORK CITY

THE dynamics of the orthodontic arch for the correction of irregularities of the teeth are the same as those of any U-shaped spring made of wire, specialized by combination to meet the requirements in tooth movement; but they seem to be little understood if appliance designs published for specific tooth movement are not misleading; i.e., a straight wire bent in U-shape, without breaking its elastic point, will return to a straight position when the power is released.

A study of its action, if the ends  $A \dots A'$  are fixed in slow moving object, and the center  $C$  is free, all being in the same plane, shows that none of these three points stand fixed. The point  $C$  drops in ratio with the movement of the ends  $A \dots A'$ . The points  $A \dots A'$  having moved at right-angles to the axis of the arch.

Fig. 1. When the spring point is broken in the forming of a U-shaped arch and the spring is set to a given expansion, this same principle holds true in modification. It is sufficient, however, to cause the point  $C$  to drop 0.5 mm. to 4 mm. expansion at  $A \dots A'$  on a 22 mm. length of wire.

If the center  $C$  is attached to the teeth, the ratio is modified in proportion to the resistance of the three points,  $A \dots A' \dots C$ . The points  $A \dots A'$  move anterior on the arc, and  $C$  moves posterior if the resistance is equal. As the resistance in the majority of cases differs either in two or three of the fixed points, the movement of the teeth is bound to occur in time at the point of least resistance.

Fig. 2. Owing to the resistance, the resultant action of the spring is seldom bilaterally equal, nor is the form of the arch maintained, and may result in unilateral expansion and a deformed arch of teeth, where bilateral action is anticipated.

Again, any contact spring attachment to these springs will modify its ultimate resting point of  $A \dots A'$ ; i.e., either by pressure or pull, or a combination of both owing to resistance to or the strength of the auxiliary springs.

Fig. 3. Again, if auxiliary springs are attached anywhere to the main arch in the proximity of the point  $C$ , the expansive power on its end  $A \dots A'$  is increased for a period, until the straightening of the curve reduces the effect of the auxiliary springs by withdrawing them from their contact with the teeth.

\*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

If these auxiliary springs are not set at equal distance bilaterally from *C*, or with varying amount of force, the result is disharmony of curve and unilateral application of force on *A . . A'*.

These illustrations are given for lingual arches; but if a simple arch is used buccolabially, the action of the arch will be reversed on the center point at *C*, and will be augmented by a fulcrum on the incisors and will result in a deformity of the arch of teeth according to the position of the fulcrum.

These finger springs on labial arches so multiply the complications in predetermining the tooth movement that the amount of power utilized cannot

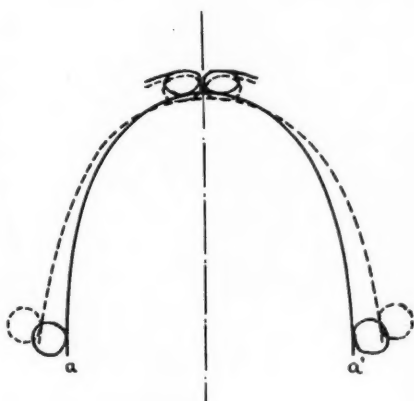


Fig. 1.

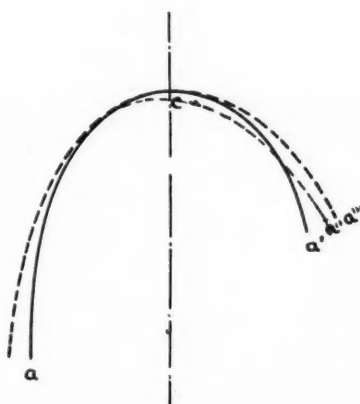


Fig. 2.

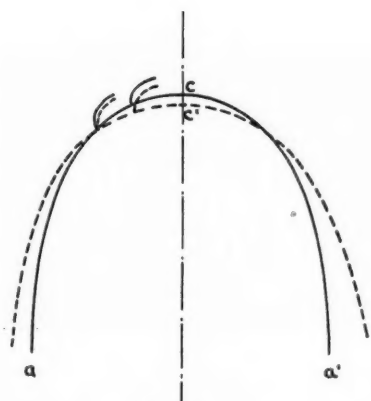


Fig. 3.

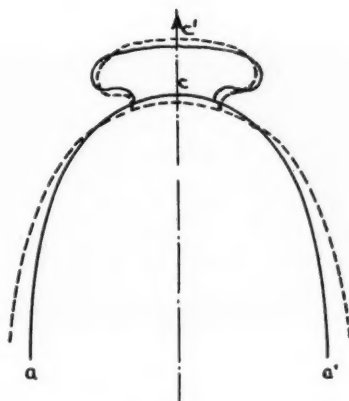


Fig. 4.

be practically computed, and is controlled only by frequent observations. The consideration of physiologic stimulation to growth is eliminated in this discussion, but is a constantly present factor varying with the age.

I have constructed a combination of arches to accomplish given tooth movements with one application of force which can be measured, eliminating many of these dynamic factors.

Fig. 4. The first requirements on constructing this appliance is that the arch must be perfect and the auxiliary spring soldered to it must be centered equidistant from the point *C* to accomplish bilateral movement. The factors of resistance remain, but a definite amount of power of expansion can be calculated



per millimeter of expansion made on the center *C*. This scientific control of the power utilized, reduces the necessity of frequent treatment and with little experience the amount of power can be governed according to the varying ages of the patient, and the estimated resistance.

The auxiliary spring expansion action should be in the same horizontal or parallel planes, and is accomplished by a reverse loop soldered on the arch at points equidistant from the point *C*. The wider the soldered points, the greater the action. Upon expanding the arch at *C*, the point *C'* travels anteriorly, and the force applied is measured in mm. expansion at *A* . . *A'*. The size of the lingual arch is 0.038, the auxiliary spring 0.028.

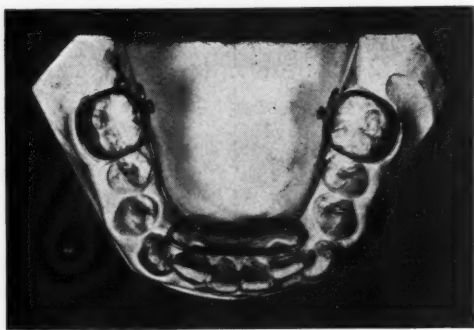


Fig. 5.

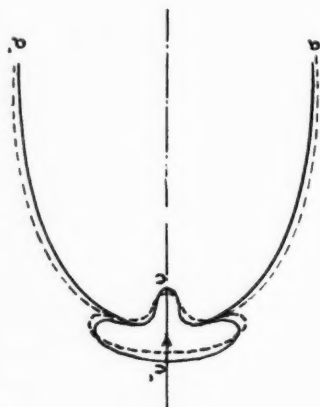


Fig. 6.

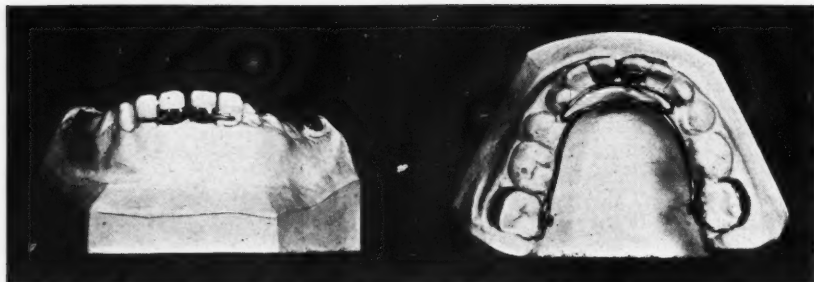


Fig. 7.

Figs. 5, 6, and 7. I am presenting two illustrations of the application of this principle with appliances constructed to correct the deformity of the mandibular arches; the first operating to carry the incisors labially and the molars buccally, the second one to expand the premolar region and rotate both lateral halves of the arch by a central loop, moving the incisors lingual by expansion of the loop at *C*. The attachments of the auxiliary spring, being equidistant from the center of the power loop, can be expanded or neutralized in their effect upon the points *A* . . *A'* on the center *C*. The point *C'* will move lingual.

The main object of this apparatus is to reduce the number of applications of force as well as knowing the amount of force applied in the tooth movement. If expansion of the molars is desired as well as the aforesaid move-

ments, the expansion of the arch is first made on the center *C*, then the expansion of the central loop. In order to modify the action of the auxiliary spring, one end is unsoldered and elevated or flattened after closing the central loop, and is resoldered to the arch. The central loop may then be expanded as desired. It is then inserted in the mouth and sprung over hooks on the incisor bands.



Fig. 8.

Fig. 8. I have designed an "Arch Shaper" upon which springs of varying sizes and lengths may be formed, both for the lingual spring (with or without loop) and the auxiliary attachments which permits of their being heat-treated while held in desired form. This instrument facilitates the accuracy of form, and is a great saver of time.

## SPRING FOR THE CONTINUOUS RETRACTION OF ANTERIOR TEETH CARRYING BRACKET BANDS\*

BY B. EDWIN ERIKSON, A.B., D.D.S., CHEVY CHASE, MARYLAND

**M**Y OFFERING here is a spring designed for the retraction of anterior teeth. It has been in routine use in my office for two years, and has proved to be comparatively trouble-free. So far it has been employed exclusively in conjunction with bracket bands.

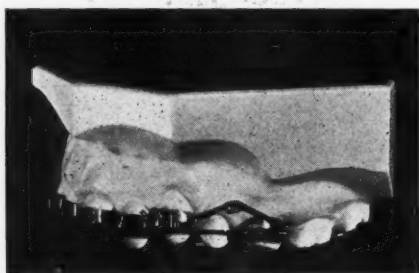


Fig. 1.



Fig. 2.



Fig. 3.

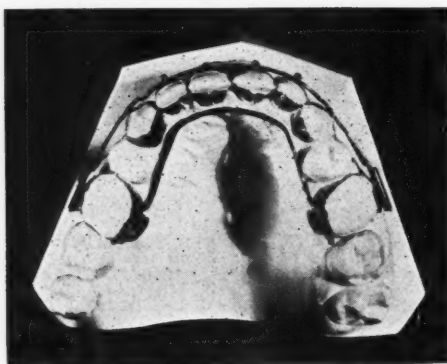
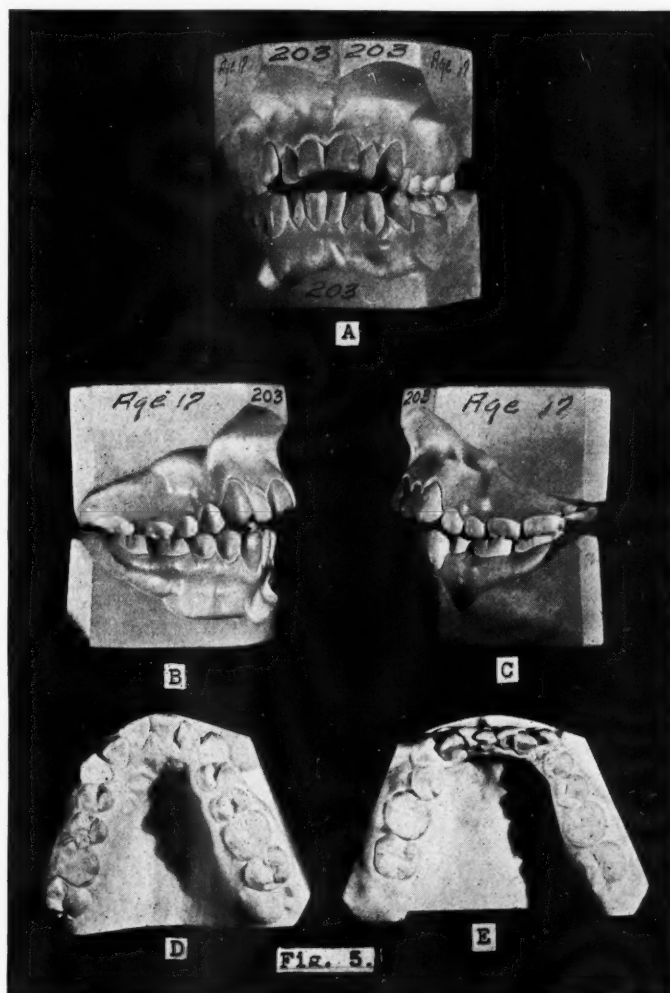


Fig. 4.

The spring consists of a portion of round wire 0.020 to 0.022 of an inch in diameter, soldered at one end to the rootwise aspect of the labial arch wire in the region of the first premolar, and bent distally in such manner as to form with the main arch wire an isosceles triangle of low altitude (Figs. 1

\*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

and 2). The main arch wire is cut of such length that when it is in adjustment upon the teeth each extremity of the arch wire clears the distal extremity of its respective buccal tube by approximately one-eighth of an inch, and by one or two slight amputations of the arch wire, made subsequently, this relationship between arch wire and buccal tube is maintained throughout the process of retraction. As will be seen from the illustrations, the spring is bent at the apex of the triangle so as to form a complete circle of small size lying within the triangle, for the obvious purpose of increasing its stretching



capacity; and again at its free extremity it is bent to form a small hook, to be engaged in the distal opening of the buccal tube. It is perhaps unnecessary to say that in order to insure free movement of the arch wire in the buccal tubes, these should be straight, either of the ordinary round kind or of the rectangular kind made for the ribbon arch.

In operation the spring on each side is given a bend such that its distal or free end lies at a point one-eighth of an inch mesial to the extremity of the arch wire (Fig. 3). The arch wire is then placed in adjustment, and the hooked end of the spring engaged in the distal opening of the buccal tube.



The appliance may be left thus undisturbed for two months, with assurance that the retraction of the anterior teeth will proceed continuously for a space of approximately one-quarter of an inch, if as much space is open.

To insure against any displacing action that may be exerted by the spring upon the anchor teeth, reinforcement may be obtained from the lingual arch (Fig. 4), which amply absorbs whatever slight displacing force there may be. If double anchorage is used, consisting of bands upon both the first and the second molars, soldered together, there need be no displacing effect whatever to be guarded against.

To illustrate this spring in actual use, I have selected a case of open bite treated at the age of seventeen, in which a satisfactory result demanded the extraction of the four first premolars (Fig. 5, *A, B, C, D*, and *E*). The model (Figs. 1 and 4) shows the appliances in position on the upper arch after completing the retraction of the anterior teeth. The entire process of retraction in this case consumed two and one-half months, and in this interval the springs were adjusted twice, which was oftener by once than was necessary.

The spring works continuously and gently, and therefore produces only a slight amount of soreness of the teeth. For the purpose of retraction, it is so superior to ligatures in any form that in my practice it has completely superseded them.

## DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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### HEMORRHAGIC DISEASES

BY STERLING V. MEAD, D.D.S., WASHINGTON, D. C.

THE hemorrhagic diseases include thrombocytopenia and hemophilia. Purpura may be a prominent manifestation in most of the acute infectious diseases. Hemorrhages may occur in the gums and gingiva in scurvy, lymphatic leucemia, myelogenous leucemia, periodontal disease, etc.

#### THROMBOCYTOPENIA (HEMORRHAGICA PURPURA)

The term thrombocytopenia is coming into more common use in place of purpura hemorrhagica. It is a condition characterized by purpuric skin lesions, ecchymosis and petechia of the gums and mucous membrane of the mouth, spontaneous bleeding from mucous membrane and gums, prolongation of the bleeding time, and normal coagulation rate of the blood, associated with failure of the clot to retract. The chief pathologic feature of the disease is the marked reduction of blood platelets. The white cell count is often moderately increased, and the red cells show variations in size and shape. There may appear in the peripheral circulation immature and atypical cells of both the red and the white series.

It is now universally believed that blood platelets are independent elements of the blood, are derived from the megakaryocytes of the bone marrow, and reach the circulating blood by budding off from the mother cells. They possess ameboid movement. It has been demonstrated that when these elements are reduced to 50,000, even slight trauma will produce ecchymosis. Whether this reduction is due to toxins which affect the platelet centers in the bone marrow, or whether the platelets are destroyed in the circulation or in some other part of the body has not been absolutely proved. An ecchymosis resembling a bruise is often seen following an extraction and it may be rather extensive, involving the entire side of the face and neck. This usually

occurs after the removal of a very septic tooth in a patient with lowered resistance. It is possibly due to a depletion of platelets from chronic infection. (Figs. 1 and 2.)

Following severe trauma a localized swelling may occur and resemble a tumor (hematoma). It may persist for some time, and may suppurate if not aborted. Fig. 3 shows a hematoma of the chin following an automobile accident. This had been present ten days when the patient presented for treatment. The swelling disappeared without incision following treatment of alternately applying hot and cold magnesium sulphate packs to the chin.



Fig. 1.

Thrombocytopenia may consist of hemorrhage from mucous membranes, varying from slight oozing to profuse bleeding. Bleeding from the gums is common, and there may also be epistaxis, and more severe hemorrhages.

The cutaneous manifestations consist of purpuric spots, varying from a few petechiae to extensive purpuric areas scattered over the body. These ecchymoses at first appear red in color, but within a few days fade and the color changes to bluish and yellowish-brown. There are frequently recurring crops of purpura.

The disease may occur in an acute form in which there is active bleeding accompanied by a mild fever and marked purpuric manifestations. The more

common form is the chronic or intermittent type which may continue for years with recurring attacks of hemorrhage and petechial manifestations.

The disease must be differentiated from the other forms of purpura in which there is usually not such a marked reduction of blood platelets, and from the symptomatic purpura which occurs in other conditions, such as diphtheria, nephritis, tuberculosis and scurvy. The characteristics of this disease, described above, will practically always serve to differentiate it from other forms of purpura.

The following is a report of the case of Mrs. R. C.:

WASHINGTON SANITARIUM AND HOSPITAL

Mrs. R. C., admitted March 13, 1928, discharged March 23, 1928. Re-admitted April 22, 1928, deceased April 25, 1928.

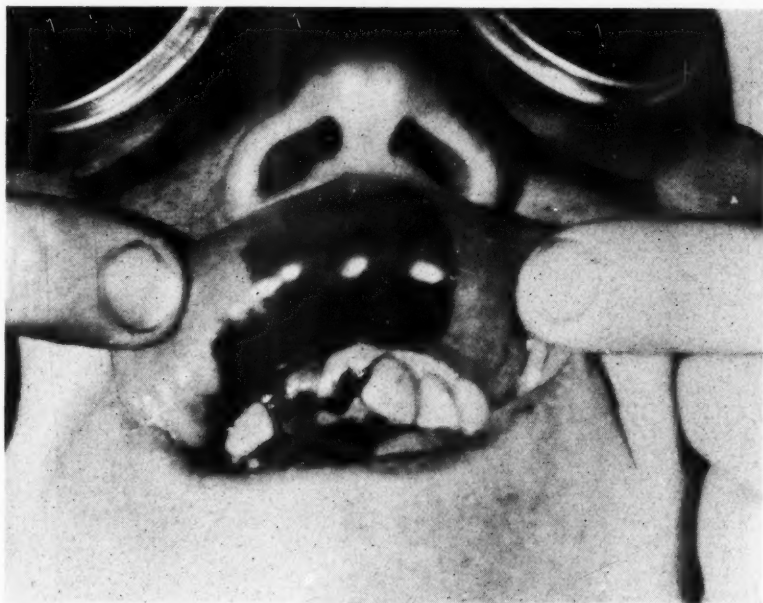


Fig. 2.

*Diagnosis: (March 23, 1928).*—Acute tonsillitis, gastric neurosis, dental infection, cardiovascular degeneration, arteriosclerosis, hypertension, periapical abscess, periodontal pockets.

*Diagnosis: (April 25, 1928).*—Purpura hemorrhagica—toxic in nature.

*Summary.*—Pain in throat and back of neck and between eyes and left ear. Says she was born with sore throat. Had quinsy every winter for a number of winters. In 1922 ear started to have a funny noise in it. Had pain in it for a time. Has had pain in ear off and on. Has had tonsillitis frequently. Present attack started Saturday night. Her teeth have been abscessed before this. Has pain in abdomen. Appetite good until this spell. Vomits after every meal (one to two hours after). Has done this many times. Started approximately 8 years ago. Worse since her operation—perineorrhaphy and ligament in 1919. Comes in spells when she gets pains in left upper quadrant—splenic flexure and vomits. Pain is dull aching in character. Vomits food two or three times. May sleep until midnight or 3 o'clock and then may get up and have spell as above. Has pain in back of head when has spells. Says has little nausea when she has attacks. Soda relieves the attacks; food makes them worse.



*Physical Examination.*—Well-developed, fairly well-nourished, white woman about 65 years of age. Pupils equal, regular, both lens opacity. Septum straight, turbinates normal. Teeth—very marked recession of the gum and bone about the lower front teeth. Three teeth remaining above—all should be extracted because of excessive recession. Some large fillings below. Lower teeth should be x-rayed to find out which ones can be saved. Tonsils still red and inflamed but no pus droplets seen. Few small glands back of the sternomastoids. No apparent enlargement of thyroid. Heart tones at apex are a little distant, regular. Blood pressure—upper limit systolic 196, lower 185; diastolic 105. Arteries show sclerosis. Anterior chest is very prominent at the level of the second costal cartilages. No percussion sensitiveness over the back. Lower central abdominal operation scar. Tender under both costal arches and markedly tender throughout the entire abdomen to deep pressure and to pinching of the flesh. Curvature of the lower thoracic spine to the left. Very large corn on the first interphalangeal joint, second toe of the right foot. It is also to some extent a hammer toe. Shows evidence of bunion operation, a scar and shortening of the big toe. Flat anterior arch and marked metatarsal callouses both feet. Fat pads below the external malleolus. Tendon reflexes of the arms normal. Knee jerks present, normal. Plantar normal.

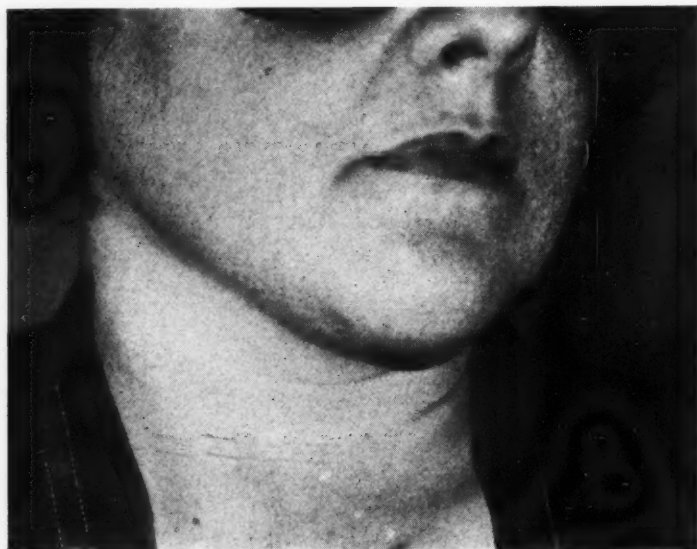


FIG. 3.

*Blood: (4-22-28).*—Newcomer Method. Hemoglobin 35 per cent, 5.9 gm. in 100 c.c. Color index, 71 per cent. Red cells, 2,240,000 (49 per cent). White cells, 933 (12 per cent). Diff. Leuc. Count: 100 cells counted. No polys. 100 per cent lymphocytes. Very few blood platelets seen.

*3-13-28.*—Patient in bed with very obvious fever. Temperature 101. Inspection of the throat shows very large tonsils with confluent droplets of pus on the left, a few on the right. Balance of examination negative.—G. K. Abbott, M.D.

*3-19-28.*—The patient's gastrointestinal symptoms I believe to be due to reflex irritation or toxic. There is no definite evidence of ulcer or other organic lesion. I think the dental infection is the chief source of the gastrointestinal symptoms. The patient has of course recently, that is upon entrance, gone through an acute tonsillitis. There is also a cardiovascular degeneration with hypertention, arteriosclerosis and an increase in the non-protein nitrogen. Of orthopedic conditions, the patient has flat anterior arch in both feet and a sacralized right transverse process of the fifth lumbar vertebra.—G. K. Abbott, M.D.

*4-16-28.*—Returns complaining of fatigue, aching on climbing and painful muscles on exertion, palpitation. Ecchymotic spots, many small ones and some large on arms, legs

and trunk, and tongue (Fig. 4). Blood pressure, left arm 140/80. Right arm 160/85. Reports having "black and blue" spots while in bed from tonsillitis recently. Had two teeth extracted one week ago. These ecchymotic spots have been a variable program since the tonsillitis.—G. K. Abbott, M.D.

4-23-28.—Patient comes in with pain in back of head, bleeding from nose, vomiting of black blood, tarry stools and large black and blue spots scattered over body in various localities. Started to have spots one month ago while here but very slight and thought bruise only. Two weeks ago had teeth extracted and mouth continued to bleed and bleed. Next nose started and shortly purpuric spots appeared on body—large and do not fade on pressure. Vomiting of blood and defecation of black stool began about a week ago. R.B.C. in urine on examination. Impression—purpura hemorrhagica.—C. H. Wolohon, M.D.

4-23-28.—Transfusion: 500 c.c. whole blood. Pulse very perceptibly better afterward. The hemorrhages from the mucous membrane ceased after transfusion.—G. K. Abbott, M.D.

4-25-28.—Diagnosis: purpura hemorrhagica, toxic in nature—probably due to recent tonsil infection, may have been due to dental infection. Patient did not rally following transfusion. Died in coma.—G. K. Abbott, M.D.



Fig. 4.

*Blood:* (4-24-28).—Newcomer Method. Hemoglobin 43 per cent, 7.2 gm. in 100 c.c. Red cells 2,464,000 (54 per cent). White cells 660 (10 per cent). Color index 80 per cent. Coagulation time 3 minutes. Bleeding time 6 minutes. Differential leucocyte count: 100 cells counted. No polys. 100 per cent lymphocytes. Very few blood platelets seen.

*Blood Chemistry:* (3-22-28).—Nonprotein nitrogen 36.2. Sugar 133 mg.

4-22-28.—Calcium 10 mg.

*Urine:* (3-18-28).—Catheter specimen: yellow, clear. Sp. gr. 1.009. Alkaline reaction. No sugar. Faint trace of albumin. No indican. No casts. Occasional pus cells. No blood cells. Occasional squamous epithelia. No mucus. No crystals.

4-22-28.—Single specimen (catheter). Dark amber. Heavy cloud. Sp. gr. 1.022. Acid reaction  $P_H$  6.8. No sugar. Trace of albumin. No indican. Occasional hyaline casts. Occasional pus cells. Moderate number of blood cells. No epithelia. No mucus. No crystals.

*Fragility of Red Cells.*—Initial hemolysis 0.4 per cent tube.

4-22-28.—Complete hemolysis 0.25 per cent tube.

*Bacteriologic Examination of Blood Culture (4-22-28).*—No growth after 72 hours' incubation.

*Dental X-Ray: (3-19-28).*—The upper left lateral and cuspid and the upper right molar, which are the only remaining upper teeth, show periapical bone resorption. There are no devitalized teeth in the mouth. The lower teeth are vital. There are root fragments in the lower left third molar area and there is osteitis shown in this region also.

*Fluoroscope: (3-19-28).*—Apices clear. Bronchi regular. Hilar shadows regular. Posterior mediastinum clear. Lung field clear. Costophrenic angles clear and free. Cardiophrenic angles clear and free. Diaphragmatic excursion good. Heart and aorta within the normal limits.

*Barium Meal: (3-18-28).*—Esophagus normal. Stomach form fishhook; tonus hypertonic; filling defects none; the whole pyloric end of the stomach definitely pressure-tender; evacuation 5 hours complete. Pylorus normal. Duodenal cap small, rough, hyperactive; fills on deep pressure only; fairly fixed in position. The patient swallows a good deal of air with the meal.

Five hours. Observation shows the stomach to be completely empty, the head of the barium in the proximal transverse colon, large amount still in the ileum. The hepatic loop portion is low, and bunched over the crest of the ilium, obscuring the cecum, which is high—also at the iliac crest. These folds of the intestine are freely movable and separable under fluoroscopic manipulation.

Twenty-four hours. The whole colon is outlined with the barium. The splenic loop is in normal position, all the rest of the outline is quite low, resulting in acute angulation of the splenic portion. The colon is narrow, deeply and irregularly haustrated, redundant in the pelvic portion.

Forty-eight hours. All of the barium evacuated except a few small pockets in the descending and sigmoid portions.

*Summary.*—1. Air swallowing. 2. Small, rough cap. 3. High cecum. 4. Low hepatic loop (superimposed on cecum, but freely movable); narrow, irregularly haustrated colon, with pockets after evacuation. Large, sacralized transverse process, right 5th lumbar vertebra.

## CLINICAL ORAL SURGERY\*

### PART TWO

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THERE is very little opportunity for the practitioner to study clinical oral surgery. During undergraduate studies, the subject is very much neglected and little chance given to observe closely and study mouth lesions, and still less to follow operative procedures and after-treatment. It is true that many textbooks have been published in the last few years, containing the usual classic description, but very little is written about clinical experience. The author, however, felt it quite timely to select in short papers about half a dozen subjects, present and describe actual cases pertaining to them and then give a short résumé of his personal clinical experience with them.

The first paper of this character having been well received, the writer was encouraged to continue the experiment with this second part of his paper on clinical oral surgery.

The different cases dealt with below are taken at random and then placed into a more or less logical sequence.

#### MALPOSED TEETH

CASE 1.†—Impacted Left Mandibular Third Molar ( $\overline{8}$ ). Female, aged fifty-three. September 7, 1927.

*Chief Complaint:* Pains in the left side of the face especially in the region of the left ear. Pain also in the left condylar region when opening the mouth and across the forehead when attempting to yawn.

At the age of thirteen, patient had a severe illness accompanied by high fever ( $104^{\circ}$ ) and ear pains; for four weeks was totally deaf until a large quantity of pus was drained from the left ear, relieving both the pain and deafness.

Pains have reappeared from time to time until about four months ago when they appeared to be localized in the region of the left ear; a physician examined the ears and found them normal; x-ray taken by dentist revealed an impacted left mandibular third molar ( $\overline{8}$ ). The pains are steady and dull, but become severe if any strain is placed upon the region as in opening the mouth.

*External Examination.*—Negative.

*Internal Examination.*—The left mandibular second molar ( $\overline{7}$ ) is badly decayed. According to the x-ray, the left mandibular third molar ( $\overline{8}$ ) is in horizontal impaction below the neck of the second molar ( $\overline{7}$ ). (Fig. 1.)

*Operation.*—Under conductive anesthesia, an incision was made downward and forward on the buccal side of the left mandibular second molar ( $\overline{7}$ ). A second one was made posteriorly from the second molar for a distance of about  $1\frac{1}{2}$  cm. A considerable amount

\*Read before the Eastern Dental Society of the City of New York, February 2, 1928.

†The histories reported in this paper were compiled from hospital and office records by Dr. Robert M. Fischer.



of bone surrounding the third molar was chiseled away until it was fairly well exposed. Removal in one piece being too difficult, the tooth was chiseled through and crown and root portion were removed separately. The flap was sutured but as a precaution, a small iodoform gauze drain was inserted between the two sutures along the ridge.

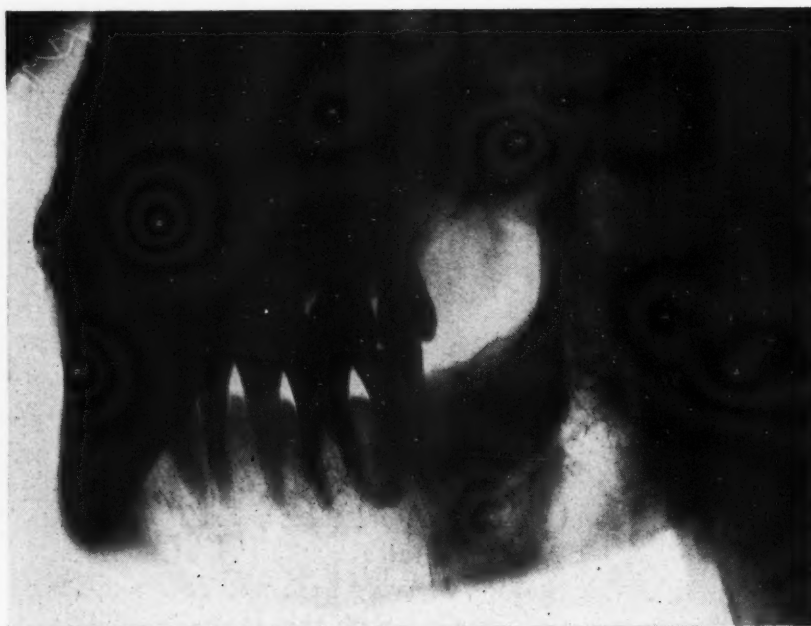


Fig. 1.



Fig. 2.—Ten days after operation.

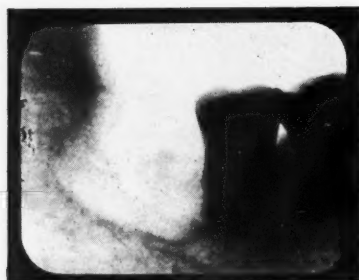


Fig. 3.—One month after operation.



Fig. 4.—Nine weeks after operation.

Following the operation, patient had considerable pain and she was seen for dressings every 48 hours. Twenty-seven days after the operation a small sequestrum was removed from the socket and one week later another. Since removal of the second sequestrum the pain has subsided and dressings have no longer been necessary. (Figs. 2, 3, 4).

CASE 2.—Infected Left Mandibular Third Molar ( $\overline{8}$ ). Pocket and Cavernous Sinus Thrombosis. Male, aged twenty. January 6, 1928.

*Chief Complaint:* Pain and swelling of the lower part of the face from the left third molar ( $\overline{8}$ ) to the right first molar region ( $\overline{6}$ ); also pain in the lower lip, and pain in swallowing.

Eleven days ago, patient felt a dull, steady pain in the region of the left mandibular third molar ( $\overline{8}$ ); the following day he went to a dentist who ascribed the pain to an unerupted left mandibular third molar ( $\overline{8}$ ) and stated that it would subside. The following day the face became swollen and he was unable to open his mouth. The dentist advised cold applications on the face, but the swelling persisted; he was kept under observation for a week, and four days ago was sent to a specialist who made an incision on the buccal side of the left mandibular first, second and third molars ( $\overline{6,7,8}$ ) and has changed dressings daily since. He also made an x-ray plate. Each time the dressing was changed there was a flow of pus from the incision; the swelling of the left side of the

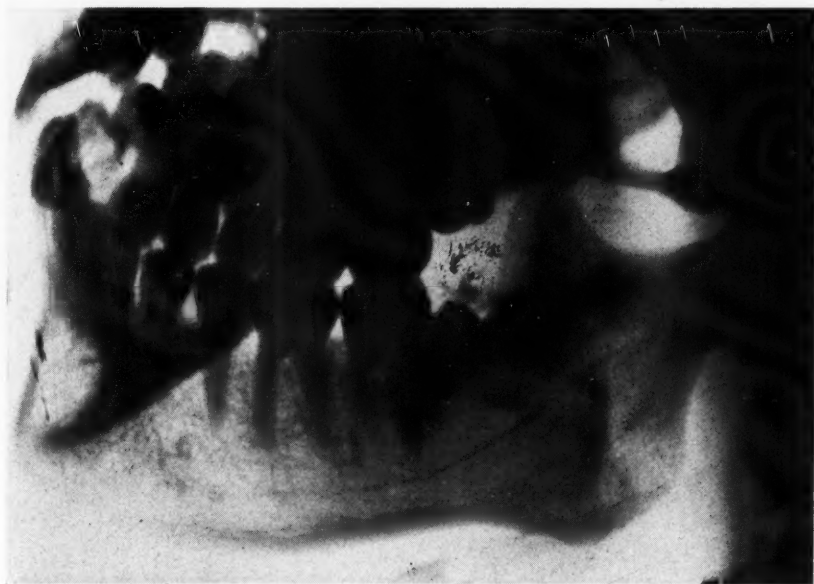


Fig 5.

face has subsided slightly since the incision, but since yesterday, the right side has commenced to swell (according to the doctor's letter).

Patient does not recall any attempt to remove the left mandibular third molar ( $\overline{8}$ ).

*External Examination:* There is swelling of the face extending from the angle of the left mandible to the right premolar region. This is hard and does not fluctuate. There is a second swelling in the region of the left mental foramen which has some fluctuation though very slight. The skin in this region appears glazed over an area of about 4 cm. in diameter. A third swelling extends from the submaxillary region on the left side under the chin causing a pronounced bulging of the soft tissues of the neck, over to the submaxillary region on the right side. On deep palpation, this swelling is indurated and sensitive; but the skin and subcutaneous tissues are movable over this swelling as well as over the other two.

*Internal Examination:* Patient is unable to open more than 5 mm. The buccal soft tissues in the left premolar region are swollen and upon pressure drops of thick, yellowish pus mixed with blood flow from the free gingiva of all the mandibular teeth on the left side and of the molars on the right side. Some of the mandibular teeth are slightly movable and all are sensitive to touch. In the region of the left mandibular first, second

and third molars ( $\overline{6, 7, 8}$ ) there is an iodoform gauze dressing in an incision about 2 cm. long through the muco-buccal fold into the third molar pocket. The lingual soft tissues on the left side are also inflamed and there is pus mixed with blood discharging from beneath the free gingivae on the lingual side of the left mandibular molar region. Temperature by mouth 101°.

X-rays reveal both mandibular third molars in horizontal impaction, crowns pointing forward. (Figs. 5, 6). Although the patient insisted that he had no recollection of an attempt to remove the left mandibular third molar ( $\overline{8}$ ), there is strong evidence of such an attempt on the x-ray plate of this region.

The patient was immediately placed in a hospital, his temperature on admission being 99.4, pulse 90, respiration 24. His blood count showed 26,600 leucocytes of which 75 per cent were neutrophiles. Three days later he was operated for drainage of the accumulated pus which by now was definitely pointing toward the face. Two incisions were necessary, one in the mental region of each side just below the mandible, each being about 2 cm. in



Fig. 6.

length. The bone was found to be denuded from the molar region on the left side to the molar region on the right. After the removal of all obtainable débris, a rubber tube and a piece of iodoform gauze were passed through from one incision to the other. The old intraoral incision was enlarged and was of course, found communicating with the areas at the lower border of the mandible. A drain was inserted here also. Just previous to the operation his temperature was 101.2, pulse 80, respiration 26. Immediately after it his temperature was 106, pulse 160. Two days later his eyes commenced to swell, eyesight became blurred and he grew incoherent in his speech. A day later this condition became worse and the temperature went up to 104. His urine which upon admission had been dark yellow, alkaline and free of albumin was now reddish brown, acid and contained heavy traces of albumin. His blood count was now 34,600 leucocytes of which 92 per cent were neutrophiles. Slightly more than 48 hours after the first operation a second operation was performed. An incision curving upward was made over the left parotid region just anterior to the ear, and considerable foul smelling purulent material evacuated. There were present also several large blood clots. The left maxilla and zygoma were found denuded by this infection, and the necrotic area could be traced upward to the base of the skull. The

odor was typical of anaerobic infection. The patient rapidly grew worse following the second operation being partly comatose, mumbling incoherently and very feverish. Twenty hours later he died. Toward the end his eyes became very much swollen and glazed due to thrombosis of both cavernous sinuses.

The two cases just read were both impacted mandibular third molars and as it happened, both were on the left side; one patient fifty-three years of age and the other twenty. Sometime ago, I wrote a paper on "Malposed Teeth,"\* wherein the statement was made that all malposed teeth should either be placed into their normal position or removed. Unfortunately, so far this remark has not been taken very seriously by the general dental practitioner and what is more surprising, not even by the oral surgeon. Referring, first to the older patient, is it fair to let a patient reach this age and subject her then to such an operation after which one must naturally expect some complication as found in this case, when sequestra formed and during their formation, made the patient's life so miserable?

The second molar in the case of the patient fifty-three years old had a large filling and although the pulp test was normal, we felt that the pain the patient complained of may come from pulpal changes in this tooth. Therefore, the patient was referred to her dentist who examined the tooth and pronounced the pulp normal. If in these cases, the second molar requires root canal treatment or where it is in doubtful condition, it should always be attended to before the operation for the removal of the impacted third molar, because if the second molar has to be extracted, it may just as well be done at the time of the operation.

The time to attend to malposed teeth is when the patient is young, or as soon as such a condition has been diagnosed. In the young, the roots probably will not be fully formed, the bone will not be quite as densely calcified, and the patient's resistance will be good and recuperative powers at par.

Let us now critically study the other case: a young man aged twenty develops an infected third molar pocket one day and dies of cavernous sinus thrombosis three weeks later, progressing probably into a periosteal abscess (if the dentist's findings were correct), followed by an osteomyelitis of the whole mandible, breaking down of the submaxillary and submental lymph glands with very little pus formation, the cellulitis traveling up to the parotid region, terminating with a thrombosis of the cavernous sinus through the veins of the face on both sides. It is immaterial at this time whether the diagnosis and treatment of any one of the practitioners on this case was correct or not, the condition surely developed first around a partly erupted and impacted mandibular third molar.

A periodic examination of the patient's teeth and jaws, which should always include a complete series of intra- and extraoral x-rays and a pulp test, would have called the attention of his dentist to the pathologic conditions present (by the way, there was also an impacted mandibular third molar on the opposite side), and if my earlier statement is generally accepted as correct, the young man's life most likely would have been spared.

\*Malposed Teeth: Their Classification, Pathology and Treatment, *Internat. Jour. Ortho., Oral Surg., Radiog.*, St. Louis, February, 1923, ix, No. 2.



It was stated above that for our purpose it is irrelevant as to whether or not the case lost by cavernous sinus thrombosis was treated correctly or not. However, there is one important thing in the author's mind which is worth while mentioning and that is that one should at times rather defer surgical interference and attempt to build up the patient's resistance first. It is bad policy to incise the wall of defense which nature attempts to build up against the invasion of microorganisms. Incising inflamed tissue like the infected and inflamed pocket around a partly erupted third molar is as a rule bad surgery unless one is by such procedure establishing drainage for a localized collection of pus (which is called an abscess). Speaking of the infected third molar pocket, experience has proved it to be much more advantageous to drain pus from such a pocket by painting the field with 25 per cent argyrol and inserting a narrow piece of iodoform gauze, and the use of a hot mouth wash and an ice bag to the side of the face as local treatment. The general care of the patient should consist of a liquid diet including orange juice, lemonade, milk, etc., free intestinal evacuation, relief of pain with aspirin, pyramidon or whatever drug may be indicated. I have never seen in my own practice a case of an infected third molar pocket which did not clear up without abscess formation. The unfortunate thing is that so many practitioners attempt the removal of the tooth which, of course, is not in reality responsible for the condition.

In the case described above, if one can judge from the x-ray, an attempt must also have been made to extract the tooth because the distal root of the third molar appears fractured.

Good surgery is still conservative and has been even many years ago. Today many of us can learn from the writings of Theophrastus Paracelsus who, in the *Opus Chyrurgicum* written by one of his pupils, Adam von Bodenstein, and printed in Strassburg, Anno 1564, says on page 1: "Du solt wissen, das sich die natur nicht ubernoeten last, noch in ein anders wesen treiben, dann jr natur ist, du musst jr nach, und sie dir nicht. Darumb bringest du Artzney die der natur nicht bequem ist, so verderbest du sie, dann sie folget dir nicht, du musst nur jr folgen." This I would translate as meaning that the doctor should help nature along but never work against it.

#### ROOT AMPUTATION

CASE 3.—Radicular Cyst (?) Originating From Left Maxillary First and Second Premolars (|4, 5) (?). Male, aged thirty. December 23, 1927.

*Chief Complaint:* Pain in the region of the left maxillary first and second premolars (|4, 5).

About twelve to fifteen years ago these two teeth were filled but patient is unable to recall whether root canal work was done at the time; in July, 1927, during routine x-ray examination a large area was seen over the apices of these teeth. Three months later, patient decided to have the roots of these teeth filled to prepare them for root amputation. Patient had no pain up to the time of filling the root canals. In October, 1927, it was discovered that the crown of the left maxillary second premolar (|5) was split mesio-distally. During the root canal treatment of the first premolar on this side the tooth became so sensitive that it was necessary to change the temporary filling every 24 hours.

At this time also the second premolar developed an acute pericementitis (according to the patient). When the acute condition subsided about four weeks later, the roots

of the first and second premolars ( $\overline{4, 5}$ ) were filled; patient had slight postoperative pain after filling but this soon passed away. Following the root canal treatment patient started to have a porcelain jacket crown made for the first premolar ( $\overline{4}$ ). During this work an injection of novocain became necessary and immediately after the anesthesia wore off, acute pericementitis again started in the second premolar ( $\overline{5}$ ).

Three days later, December 23, 1927, patient had root amputation of both teeth performed, while the second premolar was still very sensitive; the first premolar was also slightly sensitive at the time of the operation, but there was no redness or swelling present extra- or intraorally. Buccally in the region of the first and second premolars there was pain on pressure. (Fig. 7.)

*Operation.*—Under tuberosity and infraorbital conduction anesthesia a convex incision was made approximately  $\frac{1}{2}$  cm. above the free gingiva of the left maxillary first and second premolars ( $\overline{4, 5}$ ) reaching from the canine to the first molar on this side ( $\overline{3, 4, 5, 6}$ ). The thinned-out buccal plate was cut away in the region of the first and second premolars ( $\overline{4, 5}$ ) exposing the cyst cavity from which creamy pus exuded. A culture taken at this time revealed the presence of a nonhemolytic streptococcus. The apices of these two teeth were cut down by a round bur after the inflamed cyst membrane had been removed and the cut surfaces of the roots were made to conform with the general outline of the cyst cavity. The flap was then sutured into position.



Fig. 7.—Left maxillary first and second premolars prior to amputation of roots.



Fig. 8.—One month after operation.

*Postoperative Treatment.*—There had been some slight pain during the operation due to the acute pericementitis, but the next day this had disappeared. Four days after the operation the three sutures were removed and the recovery was uneventful. There has, to date, been no recurrence of pericementitis in either the first or second premolar. (Fig. 8.)

*Report of Specimen (Tissue).*—Gross: Specimen submitted for examination consists of a small, soft, pinkish mass 8 by 4 mm. in size. No definite abnormality noted.

*Microscopic:* Inflammation, chronic, nontubercular. No evidence of malignancy. No epithelial lining noted. No embryonal structures noted.

Root amputation as performed for the patient just cited does not seem to be quite as popular an operation as the author's experience would indicate it should be. I would say that it is one of the most successful conservative operations at our command. The writer is in a position to make this statement because for at least ten years, every case of root amputation was x-rayed a week, four weeks, three months, six months and a year after the operation and then every year, whenever possible.

Those of us who believe in root canal therapy in selected cases will admit that root amputation, being root canal therapy plus surgery of the apical region, is also to be highly recommended in those selected cases in which one can expect to have enough alveolus left after the operation to hold in position

a serviceable root. In my own mouth, there functioned a left maxillary premolar for twenty years until by some misfortune the root split and had to be extracted.

The percentage of success with apicoectomy is nearly 100 per cent in carefully selected cases. As a rule, the root canal should be filled with gutta percha as near the time of operation as possible so as to avoid pericemental irritation as occurred in the case cited above. In spite of this pericemental irritation both teeth became normal the day after the apical regions were cleaned out and the exposed apices cut down to conform their cut surfaces with the general outline of the bone cavity. A rose bur should be used for this purpose cutting from the apex down toward the crown. The use of the fissure bur for the same purpose should be condemned on account of the fact that it must necessarily cut away and injure the bone surrounding the root which can easily be preserved with the rose bur. In this particular case, especially (two maxillary premolars were involved), the use of the fissure bur would most likely have resulted in opening the antrum. Judging from my personal records, the use of medicaments for the cut root surface seems to be superfluous.

While in the beginning of the operation of this case the question of draining the wound was considered, the fact that it was possible to remove the whole cyst membrane and that the bone itself had a very healthy appearance, the wound was closed with three dermal sutures. It seems quite certain that both teeth will be saved and remain useful members of the patient's masticating apparatus for as long a time as any of the remaining teeth.

The history of this case of root amputation shows that the operative results were doubtful. Generally speaking, one would think of three classes of cases, the first one where with reasonable certainty one could assure the patient of success; the second one where the decision as to the result is made during the operation; the third class where the patient is informed that while the success is doubtful, it is advisable to permit the tooth to remain and defer final judgment to sometime after the operation.

#### RADICULAR CYSTS

CASE 4.—Radicular Cyst Originating From the Left Maxillary Lateral Incisor (| 2) (?). Male, aged twenty-two. September 24, 1927.

*Chief Complaint.*—Open wound in the labial region of the left maxillary central and lateral incisors (| 1, 2) which does not close.

Last May patient had swelling and slight pain in the region of the left maxillary central and lateral incisors (| 1, 2). He went to a dentist who x-rayed the area and ten days later made an incision and extracted the lateral incisor. Gauze dressings were changed twice weekly for about five months but the wound failed to close. The patient then went to another dentist who referred him here.

*External Examination.*—Negative.

*Internal Examination.*—Mouth is in unhygienic condition with hard and soft deposits present. There is a slit-like opening about  $\frac{1}{2}$  cm. in length at the mesial side of the left maxillary canine (| 3) leading into a cavity containing a piece of gauze 3 inches long. X-ray reveals a cyst in the region of the left maxillary central and lateral incisors (| 2). (Figs. 9, 10.)

*Operation.*—Under infraorbital conduction and local infiltration anesthesia, a vertical incision was made near the median line and joined by a horizontal incision along the ridge to the left maxillary canine (|3). The cyst was exposed and removed practically in toto. The tooth was then extracted because the entire mesial side of its root and apical region was exposed. The flap was then replaced and sutured.

*After-treatment.*—The following day there was a slight swelling of the face over the area operated upon, but two days following this it had disappeared. The four sutures were removed four days after the operation and the patient was seen at regular intervals for eleven weeks when he was referred back to his dentist for a prosthetic restoration.

CASE 5.—Radicular Cyst Originating From the Left Maxillary Second Premolar (|5). Male, aged twenty-eight. November 25, 1927.



Fig. 9.



Fig. 10.



Fig. 11.

*Chief Complaint.*—Swelling in the region of the left canine fossa.

On deep palpation there is slight pain. Patient first noticed it about two years ago; no history of trauma; about five years ago patient had the left maxillary first premolar (|4) filled and since then has had a feeling of slight pain in the area between the tooth and the region of the swelling; when he presses hard on the region of the swelling he feels slight pain in the tooth.

*External Examination.*—There is a slight swelling about 2 cm. wide and 2 cm. high posterior to the left nostril.

*Internal Examination.*—There is a hard swelling about 1¾ cm. wide and 3 cm. high in the apical region of the left maxillary canine and first premolar (|3, 4); there is distinct fluctuation buccally but no palpable change on the palatal side; the soft tissues over it are normal and freely movable; the first premolar has a disto-occlusal filling and appears discolored. The second premolar and first molar (|5, 6) on this side are missing. (Fig. 11.)



*Operation.*—Under extraoral infraorbital and intraoral local infiltration, a curved incision about 2 cm. long, convexity downward was made on the buccal side from the left maxillary canine (|3) to the second premolar region (|5). The bone in the apical region of the canine was almost completely thinned out by the cyst wall and the remaining shell-like bone covering the buccal wall of the cyst was easily removed with rongeur forceps. The cyst was then dissected out, a few drops of its fluid contents escaping when its very thin membrane was punctured. The wound was then sutured.

*After-treatment.*—The patient did not reappear until five days after the operation at which time his condition was found good and the four sutures removed. He was seen twice during the following week, but has failed to appear since.

CASE 6.—Radicular Cyst Originating From the Left Maxillary Central Incisor (|1) (?). Female, aged thirty-two. November 3, 1927.

*Chief Complaint.*—Swelling on the face next to the left nostril. Slight pain on pressure. Patient also has headaches and earaches.

About six months ago patient had a cavity in the maxillary left central incisor filled; the next day her face in this region became swollen and painful. The dentist opened the tooth and drained the pus through the canal. The x-rays showed a nonvital tooth adjoining, which the dentist removed as being the cause of the pus formation; for two weeks patient had dressings changed in socket of the left maxillary lateral incisor at 48-hour intervals; after that the socket was allowed to close. Headaches and earaches appeared



Fig. 12.



Fig. 13.

at about the time of the swelling; drainage of the pus in the area of the left maxillary central and lateral incisors (|1, 2) relieved the pain somewhat. Two months ago patient called physician's attention to a slight swelling on the side of the left nostril; he aspirated it through the nose and obtained several c.c. of greenish yellow fluid; the next day the face became swollen the same as before the dentist had worked on the central incisor, accompanied by pain. Dentist drained additional pus through canal of the central incisor. Several days later she went to another dentist who extracted this tooth; pus was drained through the socket for six weeks. Each day additional pus was obtained. The headaches failed to improve and patient lost fifteen pounds during this time. She then consulted a rhinologist who referred her here.

*External Examination.*—There is a swelling on the left side of the nose involving the left nasal chamber and the nasolabial fold and part of the adjoining cheek. The skin and subcutaneous tissues are movable over a swelling which is fluctuating on palpation.

*Internal Examination.*—The left maxillary central and lateral incisors (|1, 2) have been lost and there is a piece of gauze in the socket of the central incisor. The fold in the region of the central, lateral and canine is partly obliterated by this swelling which is also fluctuating intraorally. We cannot get any communication between the socket and the area in question. X-rays of the parts failed to disclose any bone pathology in the affected area. (Figs. 12 and 13.)

*Operation.*—Under local infiltration and infraorbital conduction anesthesia, a semilunar incision was made on the labial side extending from the median line to the apical region of the left maxillary canine. The mucoperiosteal flap was then dissected away from the sac which appeared about a centimeter above the ridge and which had very slightly absorbed the outer plate of bone adjoining the nasal chamber. The sac was then dissected from the scar and granulation tissues adjoining it and in so doing the lateral nasal mucous membrane was penetrated. The nasal chamber was closed off by a plastic flap from within the wound. The incision was then closed and sutured.

*Pathologic Report.*—Macroscopic: The specimen consists of an irregularly-shaped piece of tissue measuring 1.3 cm. in length. The tissues appear to be cystic and the wall composed of firm white tissue.

Microscopic: Sections show a cyst wall composed of fibrous connective tissue and lined with a columnar epithelium, which in several places forms a double layer. Toward one end of the structure the lining is composed of ciliated epithelium. Just beneath the lining there is considerable round cell and an occasional polynuclear cell infiltration. There is no histologic evidence of malignancy.

Diagnosis: Inflammatory Cyst.

*After-treatment.*—Two days following, the piece of iodoform gauze inserted into the left nostril at the time of the operation was removed. There was a slight swelling of the face in the surrounding area. Five days after the operation the four sutures used in closing the flap were removed. The plastic closure of the lateral wall of the left nasal chamber had been done with a catgut suture so this was left undisturbed. Twenty-five per cent argyrol was applied to the parts at regular intervals and five weeks after operation patient was discharged.

Cysts developing in the jaws are better understood since local anesthesia has been employed in the operations for their removal. Even the writer remembers when diagnoses of abscesses were made when in reality an operator was dealing either with an acutely infected cyst or when the cavity was filled with pus-like material. Radicular cysts developing mostly or entirely outside of the mandible or maxilla are often diagnosed as abscesses, not only for the above-mentioned reasons, but mainly on account of the fact that their peculiar development within the soft tissues covering the bone misleads the practitioner.

It is quite well known today that there are two types of operation for the treatment of cysts, namely, the conservative and radical. The conservative consists of removing the outer cyst half only, permitting the widely open and shallow inner half to become what could be called an accessory cavity of the mouth which later on flattens out to such a degree that its former presence may not be discernible any longer. The radical operation consists of the entire removal of the cyst membrane followed by total closure of the wound in some cases or folding in of the mucoperiosteal flap in others.

The first of the three cyst cases mentioned above was treated by what may be called an incision and blind curettage with the result that for many weeks the patient had to be seen two or three times a week for the purpose of changing the iodoform gauze dressing with the result that the cyst finally had to be operated on radically, after which the patient was permanently cured. Very often during a discussion of the subject one hears practitioners speak of the recurrence of cysts of this type. A cyst can never recur, but a cyst continues to grow if the operation for its eradication is not performed properly.

Returning to the question of radicular cysts developing partly or wholly in the soft tissues one must remember that the apices of buccal roots of maxillary premolars and molars as well as the apices of single rooted premolars frequently are placed very close to the buccal plate of bone or just beneath the periosteum; for which reason, at times the use of a chip blower in the treatment of the root canals of these teeth in several instances has caused air to be blown into the soft tissues of the cheek resulting in swelling which, upon palpation, gave the same sensation as tissues infected with gas bacillus.

The second cyst case is a very interesting one. A cyst about 2 cm. in diameter is situated in the premolar region, the first premolar is still vital, the second one has been lost. The cyst unquestionably developed from the second premolar at which conclusion one must arrive when considering the vitality of the first premolar as well as from evidence obtained at the time of the operation when the first premolar was removed. The cyst contents were not evacuated through this socket. Less than one-half of the cyst developed in the bone, the remaining part in the soft tissues on the buccal side, which gave the operator the opportunity to dissect out the cyst containing the cyst fluid in toto and closing the wound entirely. The x-ray of this area revealed loss of bone, the amount of which, however, did not correspond to the size of the cyst, which is quite easily explained.

The third case formed on the labial side in the region of the central and lateral incisors; apparently both teeth were involved, although we can assume from the usual position of the apex of the lateral that the cyst in question originated from the central incisor. There was a very shallow indentation of the labial plate which one would ordinarily ignore and consider normal. Still, in spite of the fact that the cyst was entirely in the soft tissues and that during the time of the operation no connection with the dental system could be found, the history of the case points toward a radicular cyst and the microscopic findings show an epithelial lining characteristic of it. The ciliated epithelium described in the same specimen is part of the mucous surface of the nose removed at the same time. Further study necessitated a change in this diagnosis which can be found in an article entitled "Do All Cysts in the Jaws Originate From the Dental System" which was read before the Section of Oral Surgery, Exodontia and Anesthesia of the American Dental Association, August, 1928, Minneapolis, Minn., and will appear in the Journal of the A. D. A.

#### ODONTOMA

CASE 7.—Odontoma. Female, aged thirty-nine. April 6, 1927.

*Chief Complaint.*—Pain in the left maxillary canine and premolar regions, radiating back as far as the ear and downward along the mandible to the canine region.

About twenty years ago patient happened to feel a small swelling intraorally in the region of the left mandibular third molar ( $\overline{8}$ ), but neglected to have it examined. There was no pain or discomfort until two years ago when she had a partial lower denture made. She was unable to wear it because of pain upon the slightest pressure in the left mandibular second and third molar regions ( $\overline{7, 8}$ ). In September, 1926, she developed a severe toothache in the region of the left maxillary first molar ( $\overline{6}$ ) immediately following the removal of a fixed bridge. This bridge had been in position for fifteen

years and employed a gold crown on this tooth as an abutment. The tooth was removed a few days later but the pains in the maxilla continued. The patient then went to the dentist for four weeks for treatment without relief. No x-rays were taken until after the fourth week when she went to a specialist who x-rayed the left maxilla and mandible and told her she had a tumor. She then went to another dentist for another opinion; he first operated on the upper jaw curetting the soft tissues in the region of the left maxillary first molar ( $\overline{16}$ ) and about two weeks later attempted to remove the tumor in the left mandible. After three hours he had to stop. The patient went to bed and the wound was dressed and irrigated daily at home for two weeks and at the office for over two months. Patient then went to an oral surgeon in New York who took x-rays and advised an antrum operation and removal of the left maxillary second molar for relief of the maxillary pains before operating upon the tumor; he also dressed the wound; patient was then referred for further diagnosis.

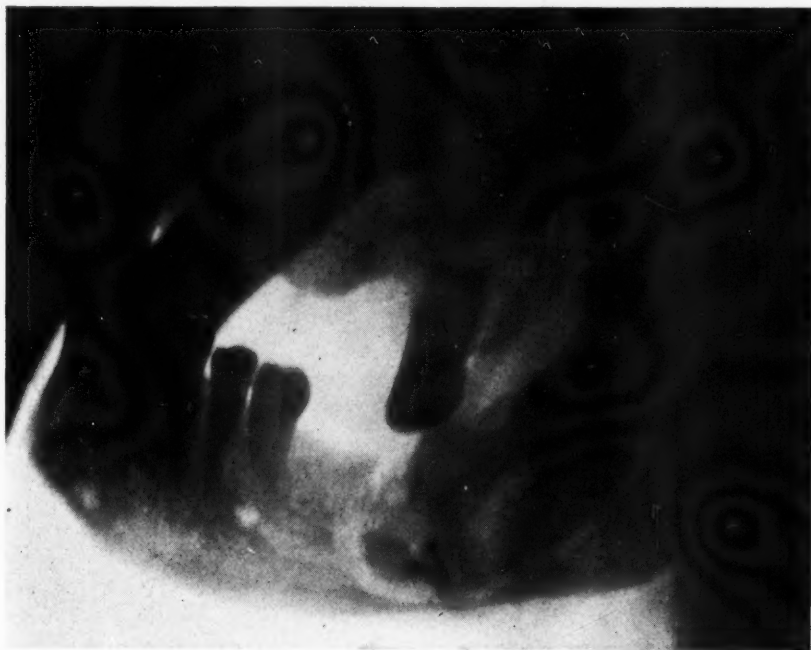


Fig. 14.

*External Examination.*—There is a slight enlargement in the region of the left mandible anterior to the angle to approximately the mental foramen; skin and subcutaneous tissue are easily movable over a hard swelling approximately 2 cm. in length at the lower border and buccally; no sensation in the mental region.

*Internal Examination.*—In the region of the left mandibular second and third molars ( $\overline{17, 8}$ ) there is an opening  $\frac{1}{4}$  cm. long and  $\frac{1}{2}$  cm. wide externally to the ridge and approximately 1 cm. deep which bleeds slightly. The bone is uncovered in parts. Removed piece of iodoform gauze from wound. There is nothing to be seen in the upper jaw except scars; in the maxilla the right central incisor, second premolar, first molar and left central incisor, canine and second molar are present ( $\overline{6, 5, 1 | 1, 3, 7}$ ); the pain is anterior to the left maxillary second molar ( $\overline{17}$ ). The left submaxillary glands, especially one, are very much enlarged, movable, and not sensitive to touch.

X-ray reveals a tumor in the region of the left mandibular second and third molars ( $\overline{17, 8}$ ) with a tooth lying in its posterior portion in semihorizontal position, crown pointing forward. (Fig. 14.)





Fig. 15.—Wiring of jaws five days after operation.



Fig. 16.—Nine months after operation.

*Operation.*—Under conductive and local infiltration anesthesia totalling 8 c.c., an incision was made along the ridge posterior to the left mandibular first premolar ( $\overline{4}$ ) and up about  $1\frac{1}{2}$  cm. along the anterior border of the ascending ramus. A second incision about  $1\frac{1}{2}$  cm. long was made downward and forward on the buccal side just posterior to the left mandibular first premolar ( $\overline{4}$ ). The bone posteriorly, buccally and lingually to the embedded left mandibular third molar ( $\overline{8}$ ) was first chiseled away until the tooth was exposed. When the odontoma appeared loose an attempt was made to dislodge



Fig. 17.



Fig. 18.

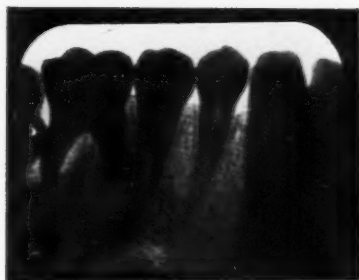


Fig. 19.

it, resulting in a fracture of the mandible at its thinned-out lower border (Fig. 15). At the next attempt it was removed in two equal halves, the posterior one containing the tooth. The loose fragments of labial and lingual plates and other débris were removed; the jaws were then wired together and two pieces of iodoform gauze inserted into the wound just deep enough to prevent union of the two lips of the wound. As previously arranged, the patient then went to the hospital immediately following the operation and remained there five days. Four weeks after the operation, the intermaxillary wires were removed and one month later the interdental wires were taken off. At this time she was so far improved that she was referred to a prosthodontist for her lower denture. (Fig. 16).

CASE 8.—Odontoma. Female, aged fifteen. July 28, 1927.

*Chief Complaint.*—About July, 1926, patient first noticed a swelling in the left mandibular second molar region ( $\overline{7}$ ) accompanied by severe continued pain; the swelling gradually became larger until it reached the level of the mandibular occlusal plane.

Patient then went to a dentist who x-rayed the area and referred her to a surgeon. An intra- and extraoral operation was performed under ether and some of the bone in the region removed. After the operation, pus commenced to drain from the wound; it had to be dressed extraorally for a year. In July, 1927, patient developed trismus with a swelling of the face and extreme pain in the left tonsillar region when swallowing; the swelling within the mouth had also increased in size.

*External Examination.*—Swelling of the left side of the face in the region of the mandible. Two fistulous openings just anterior to the angle of the jaw discharging pus and also a large amount of scar tissue surrounding it.



Fig. 20.—Five weeks after operation.

*Internal Examination.*—Marked thickening of the body of the mandible beginning at the premolar region to and including a great part of the ascending ramus. A wound on the upper surface of the mandible about 2 cm. in length and approximately  $\frac{1}{2}$  cm. in width is discharging pus and protruding from it is a hard mass of dark yellow color resembling tooth structure.

X-ray findings showed an odontoma in contact with it at the lowest surface a molar tooth. (Figs. 17, 18, 19.)

*Operation.*—One-sixth gr. of morphine and 1/200 gr. atropine was given hypodermically.

Under conduction and local infiltration anesthesia totalling 10 c.c. of 2 per cent novocain solution, the left mandibular first molar ( $\overline{6}$ ) was extracted and then an incision made forward and downward about 1 c.c. from the gingiva of the left mandibular second premolar ( $\overline{5}$ ). Another incision was made backward along the anterior border of the ascending ramus over the posterior end of the tumor. With the soft tissues retracted and after chiseling away considerable bone, the tumor was removed en masse

by a large pair of rongeur forceps using a bucco-lingual and rotating motion. The malposed molar was next removed after being freed of bone and granulations. The granulation tissue separating the tumor and bone was then curetted away at which time about 2 cm. of the contents of the mandibular canal were exposed. The granulations in the two external openings were then cleaned out and the intraoral wound packed with two pieces of iodoform gauze just deep enough to keep the lips of the wound apart.

The patient was seen at regular intervals after the operation and iodoform gauze was used to keep the wound protected for eighteen days until healthy granulations had formed. (Fig. 20).

These two cases of odontomas of the mandible seemed to be especially well selected for a paper of this type. The first one of a female patient, age thirty-nine, who came to my office with a letter from her dentist, part of which read as follows: "Patient presented herself about six months ago with what appeared to be an extensive osteoma of the left mandible together with an impaction of the third molar as the x-rays will indicate. At that time I proceeded to remove the osteoma under conductive anesthesia; complications arose and it appearing that the growth was much more extensive than I anticipated, I discontinued the operation. She has been suffering continually since, pain being concentrated in the upper jaw which presents a history of an extraction of the upper first molar prior to the lower operation with possible involvement of the antrum."

First of all the diagnosis of osteoma was incorrect. Secondly, the general practitioner should not undertake treatment of an extensive case of this type. It not only resulted in six months of suffering for the patient, but unquestionably had much to do with the accidental fracture of the mandible during the operation, as a noticeable infection had set in and weakened the surrounding bone, thereby prolonging the after-treatment of this case considerably besides causing the patient additional suffering and discomfort. The loss of so much structure made the restoration extremely difficult for the prosthodontist. However, this dental practitioner must be judged rather leniently, because even an oral surgeon who saw this case later on did not diagnose the condition in the mandible, but was quite willing to operate upon the maxilla and antrum on the same side, misled by pains referred to this region from the mandibular nerve.

Let us discuss the case of the young girl fifteen years of age. The helpless creature falls into the hands of a general surgeon who was absolutely ignorant of the operative procedure, put the patient under ether, operated intraorally first and when unsuccessful continued with an external incision but could not remove the odontoma, with the result that the patient had to be dressed and bandaged for one year.

My discussion of these two cases was frank not with the intention to condemn the two doctors or to criticize them severely, but because we all can learn the lesson not to attempt major operative treatment of cases without correct diagnoses and without a fair knowledge of the operative procedure or the complications one may encounter.

It is well also to think of the possibility of fracture and to be ready at any time to wire the jaws as soon as the operation is completed as was done in the first case.



## GIANT CELL TUMOR

CASE 9.—Giant Cell Tumor. Female, aged thirty-five. November 25, 1927.

*Chief Complaint.*—Swelling on the buccal side in the region of the left maxillary second premolar (|5).

About four months ago patient had a growth the size of a lima bean removed from this region. This growth had made its first appearance about two months previous to the operation. Patient has been wearing a full upper vulcanite denture for about a year and a half.

*External Examination.*—Negative.

*Internal Examination.*—There is a slight swelling on the buccal side of the maxilla in the region of the left maxillary second premolar and first molar (|5, 6); this swelling is purplish red in color and presents an irregular surface; it is about 2 cm. long and ½ cm. high, soft and slightly movable. (Fig. 21).

*Operation.*—Under local circumscribed infiltration, an incision was made along the ridge corresponding to the left maxillary second premolar, first and second molars (|5, 6, 7). The bone on the buccal side surrounding the growth was chiseled away, thus exposing the antrum. The growth with adherent bone was entirely removed and the flap sutured.



Fig. 21.—Giant cell tumor. The original negative shows a soft tissue shadow corresponding to the projection of the tumor on the film.

*After-treatment.*—The day following the operation the face was slightly swollen and when next seen two days later there was still a slight swelling but the wound healed normally and six days after operation the four sutures were removed. Twenty-five per cent argyrol was applied to the wound twice weekly for the next two weeks when patient was discharged.

A giant cell tumor is a benign newgrowth which recurs only when not completely removed, as it did in this case. It is well, therefore, to thoroughly examine such a tumor and the surrounding tissue by means of the x-ray and remove the tumor itself with a fair layer of normal tissue surrounding it. Its appearance is typically lobulated, firm, and covered by normal mucosa except where traumatized by opposing teeth. (Figs. 22, 23, 24.) In this instance, when the second operation was performed by the author the antrum was opened but found healthy. To close the antrum with a flap covered with mucous membrane was impossible; therefore, part of the buccinator muscle was dissected out and used to close the maxillary sinus. This fortunately was successful.

In the near future an additional operation will be performed should the partial obliteration of the buccal fold necessitate further interference.

It may be of interest at this time to mention that although only the left premolar and molar region was affected, a complete series of intra- and extra-

oral films was made which revealed a number of roots embedded in the bone, the removal of which was recommended to the patient and attended to. It seems to me an excellent opportunity to explain to the patient the wisdom of a thorough and complete examination of the teeth and jaws and surrounding soft tissues and to call their attention to other pathologic conditions which may be present. Thus we can at least make up in part for the lack of understanding of the importance of periodic examinations by both the profession and the public.



Fig. 22.—Giant cell tumor, left maxilla. X-ray appearance simulating, in a way, a multilocular cyst (not described in paper).



Fig. 23.—Giant cell tumor (specimen and x-ray) with calcification posterior to premolar (not described in paper).



Fig. 24.

Before dismissing this subject, I would like to cite the report of the pathologist on the specimen removed after the first operation which was as follows: "I beg to report that the specimen of tissue submitted to me for diagnosis has been examined microscopically and that the growth is a giant cell sarcoma or a malignant epulis. The mucous membrane shows the result of a chronic inflammatory condition but at no place are there any changes of a carcinomatous character. Giant cells are numerous and the entire picture is typical of an epulis. These tumors are, as a rule, not malignant and recurrence is not frequent."

The above compares of course very unfavorably with the one submitted by another pathologist who examined the second specimen and which reads:

*“Macroscopic Examination:* The specimen consists of a piece of tissue 1.2 cm. long and about 1 cm. in width and 0.8 cm. in thickness. The surface appears smooth and apparently consists of mucous membrane. On cross-sectioning some brittle bone is found.

*“Microscopic Examination:* The sections show a surface of squamous epithelium, beneath which there is some fibrous tissue and bony trabeculae. Surrounding the latter and invading the soft tissues are closely packed spindle cells in which are imbedded many multinucleated giant cells.

*“Diagnosis.—Giant-cell tumor (epulis).”*

This is still a big field for study as comparatively little is known of the pathology of the mouth.



Fig. 25.

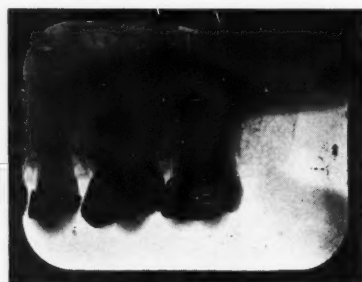


Fig. 26.

#### MAXILLARY SINUS

CASE 10.—Chronic Apical Pericementitis of the Right Maxillary First Molar (6|) with Antrum Involvement. Female, aged twenty-seven. November 1, 1927.

*External Examination.*—Negative.

*Internal Examination.*—Negative.

*X-ray Examination.*—Negative (Fig. 25, 26).

The pulp test of the right maxillary first molar (6|) shows it to be nonvital. This tooth was removed under circumscribed local infiltration. The extraction was difficult and the palatal apex was found to be covered by granulating tissue about one-third cm. in diameter. A probe was then passed into the disto-buccal socket and a communication with the antrum found. The latter was then opened by making an incision on the buccal side of the right maxillary second premolar (5|) and chiseling away the buccal plate at the first molar on this side (6|). A large amount of granulating tissue was curetted from the apical region of the first molar (6|) and from the floor of the antrum which was open. The bone was then smoothed and the flap held in place with four dermal sutures.

*After-treatment.*—The next day there was slight pain and swelling and on the day following a slight odor was noticeable but with the aid of zonite as a mouth wash this cleared up and four days after operation, the sutures were removed. Patient was discharged two weeks later.

CASE 11.—Involvement of Right Antrum and Both Ethmoids. Male, aged forty-seven, December 10, 1927.

*Chief Complaint.*—Pain on the left side of the nose and through the head.

Two months ago patient had some right maxillary teeth extracted.

*External Examination.*—Negative.

*Internal Examination.*—There is evidence of recent extraction in the premolar and molar region in the right maxilla. There are bluish black spots on the labial mucous membrane in the lower anterior region. The mucosa of the cheek is bluish white in parts.

The pulp test indicates normal vitality of the remaining teeth.

X-rays show indentations along the alveolar ridge of the maxilla in the region of the recent extractions. A complete x-ray examination of the mouth was made and the patient's sinuses were also x-rayed, showing involvement of the right antrum and both ethmoids and therefore patient was referred to a rhinologist.

The maxillary sinus from an anatomic and physiologic standpoint belongs unquestionably to the rhinologist. The exceptions form those cases where the antrum becomes involved through dental or maxillary bone disease; and even then a complete examination of all the sinuses by means of x-rays and by the rhinologist must be made and operations performed in conjunction with the rhinologist if the nose and other sinuses are involved simultaneously.

Accidentally, of course, one may have to open the antrum as was done in the first case; then all diseased tissue, like granulations or polypoid tissue, etc., is removed and the operation completed in whichever way the case indicates. (The author's viewpoints are indicated in his previous paper.\*) However, the author is frank enough to state here that many an antrum has been opened needlessly and uselessly, an example of which might have been the second case. Here a dentist, by the way an oral surgeon, based his diagnosis of the condition of a maxillary sinus upon one postero-anterior plate and wrote the following findings and advised: "Antero-posterior plate of patient reveals the right maxillary sinus to be foggy as compared with the left side. Transillumination of the right sinus (antrum) poor. Small dental films reveal an unusually large maxillary sinus, with a periapical granuloma above the border of same. The sinus should be opened up and cleared from its infection."

Today the routine x-ray examination of the sinuses by a conscientious roentgenologist should consist of three stereoscopic sets of plates, namely, one lateral and two postero-anterior views.

Now compare the report of such an x-ray examination of the same case with the previous one: "Both frontals are large and clear. Both antra are very large and show deep alveolar recesses. The left antrum is clear and can be traced throughout. The contour around the alveolar recess is very definite and clear cut. On the other hand, the right antrum is cloudy throughout. The density of the cloudiness is greatest in the alveolar recess region. As one views the contour of the bone of the alveolar recess region, there seems to be a break in its continuity at its very tip. The *sphenoid* sinus is large and clear. The *ethmoid* cells on the left are clear. The ethmoids on the right are cloudy. The cloudiness, however, is not as pronounced as in the maxillary sinuses. The *nasal septum* shows marked deviation to the right. A very sharp spur protrudes almost to the lateral nasal wall on the right."

With this report the patient was sent to a rhinologist who forwarded the following opinion: "The patient has an exceedingly bad deviated septum and

\*The Oral Surgeon's Position in Diseases of the Maxillary Sinus, INTERNAT. JOUR. ORTHO., ORAL SURG., AND RADIOG., St. Louis, May, 1922, viii, No. 5.



hypertrophied turbinates, with a low grade ethmoiditis on both sides. Puncture of the right antrum reveals a small amount of thin mucopus. I feel that while he may have had an antrum infection originally from his teeth, the reason for its persistence is undoubtedly his nasal condition. I have accordingly advised him that he should have a septum and turbinate operation as well as an intranasal antrum operation."

To summarize, the oral surgeon would have been perfectly willing to operate on the antrum after which a nasal condition and diseased ethmoids would have unquestionably continued to infect the same antrum. To reiterate, diseases of the maxillary sinus belong to the field of the dental or oral surgeon only, if they are caused by dental or maxillary bone diseases, provided the nose and other sinuses are normal. However, treatment of the maxillary sinus should not be undertaken without a complete and thorough x-ray examination of all the sinuses.

The first paper on Clinical Oral Surgery emphasizes especially conservatism in our special field of surgery. The writer is still of the same opinion and hopes that his thoughts will be studied carefully and put into practice to avoid, if possible, not only untimely death, but many complications which, with conservative treatment would save the patient and operator many painful and sorrowful hours. However, from the above-mentioned cases, we can also learn that to practice our specialty conscientiously means building up a solid fundament first, followed up by years of practical study and experience. When so equipped, the oral surgeon will realize and understand when to treat the maxillary sinus and when to refer the case to the rhinologist. He will know when to operate and when not to. In other words, he will be in a position to use sound judgment in the care and treatment of his patients, sound judgment built on knowledge and experience.

101 EAST SEVENTY-NINTH STREET.

## CERTAIN DISEASES OF THE ORAL MUCOUS MEMBRANE AND VERMILION BORDERS OF THE LIPS\*

BY BEDFORD SHELMIER, M.D., DALLAS, TEXAS

**D**ISEASES of the oral cavity may be divided into surgical and nonsurgical. The importance of the former has necessitated the development of a specialist in this particular field of medicine, the oral surgeon. His achievements during the past decade are ample proof of the need of this specialist. At the present moment he has established himself as a necessary adjunct to our complicated system of healing.

The nonsurgical conditions of the oral cavity have received but meager attention in the literature and many of the frequently occurring disturbances of the oral mucous membrane pass the general practitioner unrecognized. When it is remembered that many of the constitutional diseases may have their initial visible manifestation in the oral cavity, the importance of this field of medicine may be apprehended. Among these may be mentioned the raspberry tongue of scarlet fever; Koplik's spots of measles; the oral hemorrhages, ulcerations and infiltrations of the various leucemias; the glossitis of pernicious anemia and the ulcerations of agranulocytic angina; the stomatitis of pellagra and the hemorrhages of scurvy; and a host of other conditions from the pinhead white oral tubercle of miliary tuberculosis to the petechial hemorrhage of bacterial endocarditis.

The past has produced the oral surgeon, a specialist skilled in the treatment of surgical conditions of the oral cavity; the future will demand that every physician be well versed in the diagnosis and treatment of the many nonsurgical conditions of this same cavity.

### STOMATITIS FROM DRUGS

A large number of drugs are capable of producing cutaneous eruptions. Scarcely a single remedy has escaped blame for the causation of some cutaneous exanthem. With greater knowledge of the eruptions provoked by the ingestion or intravenous injection of drugs, we are now seeing more oral lesions due to this cause, and apparently correctly diagnosing some cases of hitherto unexplained stomatitis. Routine examination of the oral cavity in cases of dermatitis medicamentosa shows this region to be frequently affected. Knowledge that the oral cavity alone may be affected by such drugs prompts us at least to suspect certain medicaments and inquire as to their ingestion. Drugs which are most frequently found to cause oral lesions are: the antisyphilitics (mercury, bismuth, arsphenamin), the analgesic antipyretics (antipyrin, acetanilid, and phenacetin), the barbitol group (includ-

\*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-first Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

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ing veronal and luminal), the salicylates and phenolphthalein compounds, although other drugs are rarely capable of causing oral lesions.

*Mercury.*—This drug is capable of causing morbilliform, scarlatiniform, papular, urticarial and erythema nodosum-like lesions on the skin. A troublesome soreness and hyperemia of the pharynx with macules on the soft and hard palate has been recently observed in one of our patients treated with mercurial inunctions. The various types of mercurial stomatitis are too fully treated in the various texts to demand space here.

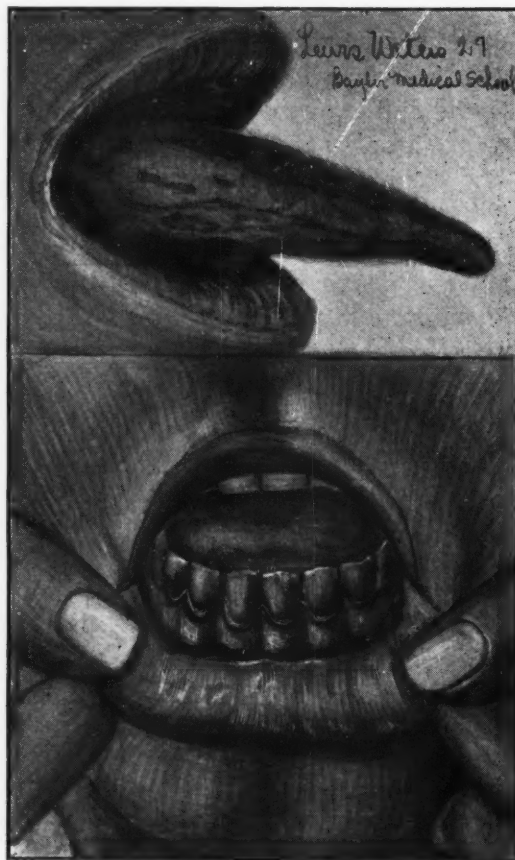


Fig. 1.—Bismuth stomatitis. Pigmentation of lips and tongue infrequent.

*Arsphenamin.*—An acute arsphenamin dermatitis may be morbilliform, scarlatiniform, vesicular, bullous, lichenoid, purpuric, urticarial, pigmentary, and even erythema nodosum-like lesions have been reported. In the later stages a generalized exfoliative dermatitis may result. An arsphenamin stomatitis may occur alone or in association with a cutaneous eruption. The mucous membrane, in well developed cases, is dry, hot, red and shows varying degrees of exfoliation. In contrast to mercurial stomatitis, the flow of saliva is decreased and there is no odor. In the early stages of an arsphenamin dermatitis, macules, hemorrhages and vesicles are noted on the mucous membrane in conjunction with the cutaneous eruption. In a case of mild arsenical dermatitis observed by the author, pea to dime-sized bluish-colored pigmentations appeared on the vermillion and inner surfaces of the lips. These

resembled the pigmentations of the oral mucous membranes caused by silver, lead, bismuth, and occasionally by phenolphthalein and drugs of the antipyrin group. Similar polychromatic macules occurring on the glabrous skin after arsphenamin injections have been reported by other observers.

*Bismuth.*—A blue to bluish-black pigmentation of the gums is noted in patients treated with bismuth. This pigmentation, often closely resembling the "lead-line," but more uniform and not so stippled, begins at the free borders of the gingivae and with repeated injections of the drug gradually



Fig. 2.—Stomatitis from luminal.



Fig. 3.—Stomatitis from phenolphthalein.

spreads toward the base of the gum. Pea to dime-sized faint, bluish-colored macules are occasionally observed on the inner surface of the lips and sides and under surface of the tongue. The incidence of bismuth stomatitis is high, fully 10 per cent of the patients at Baylor Clinic thus treated showing this form of pigmentary stomatitis with gingival irritation (*Fig. 1*). The disappearance of this pigmentation after cessation of bismuth therapy is slow, if at all, months frequently elapsing before a mild pigmentation of the free borders of the gingivae completely disappears. On again beginning the drug, this pigmentary stomatitis rapidly reappears. In the severer forms of



bismuth stomatitis, ulcerations, indistinguishable from those caused by mercury, are not infrequently encountered.

*Antipyrin, Acetanilid, Phenacetin, Pyramidon, and Other Drugs of the Antipyrin Group.*—These drugs give rise to morbilliform, scarlatiniform, vesicular, bullous, hemorrhagic, urticarial and "fixed" eruptions. The most characteristic feature of this group of drugs, along with phenolphthalein, is their tendency to cause eruptions of the buccal cavity and genitalia, and for pigmentations of a violaceous color to follow erythematous and urticarial lesions of the skin. In patients sensitive to such drugs, it is not infrequent to find oral lesions alone or associated with genital lesions. The manifestations in the oral cavity vary from congestion of the pharynx, swelling of the tongue and edema of the lips resembling angioneurotic edema, to vesicular and bullous lesions followed by erosions and deep ulcerations. A peculiar bluish pigmentation of the anterior part of the tongue and an apparent

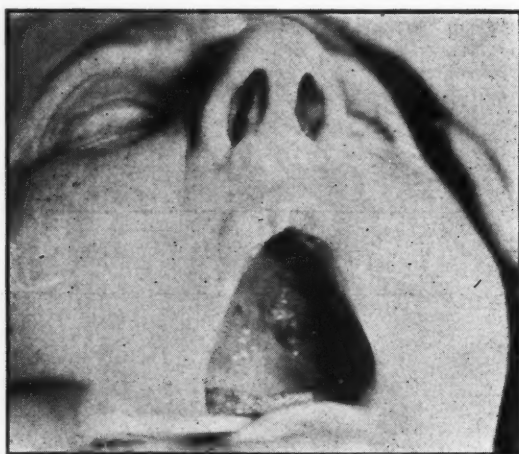


Fig. 4.—Bromoderma (Collection, Dr. L. McCafferty).

superficial atrophy of this organ has been reported to have followed repeated attacks of antipyrin glossitis. Greyish-white papular lesions of the oral cavity resembling lichen planus have been reported by other observers. In chronic acetanilid poisoning, seen in the so-called "acetanilid habitués," a peculiar cyanosis of the lips and buccal mucous membrane results from the formation of methemoglobin.

*Barbital Group.*—Drugs of this group produce cutaneous eruptions similar to those provoked by members of the antipyrin group. In the oral cavity, luminal may produce lesions varying from a mild congestion and edema to vesiculations and bleb formation, followed by erosions and ulceration. The accompanying illustration (*Fig. 2*) shows extensive vesiculation and ulceration of the oral mucosa in an epileptic sensitive to luminal. No cutaneous rash was present in this case. We have observed a physician who showed herpetic lesions of the lips and glans penis after each ingestion of veronal. Other drugs of this group (for example, sulphonal, trional) are said to cause similar oral and cutaneous manifestations. Oral lesions produced by this

group of drugs are clinically indistinguishable from those produced by phenolphthalein and members of the antipyrin group.

*Salicylates.*—Drugs of this group cause various types of cutaneous eruptions, and erosive lesions of the buccal mucous membrane and glans penis. I have seen extensive ulcerations of the tongue and soft palate follow the intravenous injection of sodium salicylate for rheumatism. Edema, vesiculations and superficial erosions of the mucous surface of the lower lip were noted in a case similarly treated. Empirin compound (phenacetin?) also caused an identical eruption in this same patient. In a third subject, yellowish, pea-sized papular lesions were noted in the same location following the oral administration of sodium salicylate. In one case, questionable ulceration of the pharynx was noted after salicylates.

*Phenolphthalein.*—Various types of eruptions are observed after the ingestion of phenolphthalein in a patient who has an idiosyncrasy for this drug. The most characteristic cutaneous eruptions provoked, however, are erythematous, urticarial or bullous lesions which leave dime to dollar-sized violaceous plaques at their former sites. Oral and genital lesions, independent of cutaneous eruptions, are frequent. We have recently seen a diagnosis of pemphigus made in a boy, sensitive to phenolphthalein, who presented extensive bullous lesions of the mouth and skin. Polychromatic macules at the sites of former bullae gave a clue to the diagnosis. A test dose of phenolphthalein caused a return of the bullous lesions within twenty-four hours.

The ingestion of small doses of phenolphthalein as a laxative by a sensitive individual may cause an alarming reaction. Intense swelling of the tongue and lips, of angioneurotic characteristics, has been observed. The most frequent lesion, however, is the appearance of vesicles on the vermilion border and mucous surfaces of the lip. Due to heat and moisture of the part, erosions and secondary ulcerations take place. Intense congestion of the pharynx may be present. A peculiar bluish discoloration, similar to the polychromatic macules of the skin has been reported by other observers, as have ulcerations on the tongue and in the pharynx.

The accompanying illustration (*Fig. 3*) depicts a patient in whom the oral eruption was induced seven different times by a test dose of the drug. With each new group of students in the clinic, one phenolax wafer was given this patient and the eruption immediately appeared, healing spontaneously within ten days after cessation of the drug. The sensitiveness to phenolphthalein remained stationary in this patient. Idiosyncrasies to a given drug may increase, diminish or entirely disappear. This patient was apparently sensitive to no other drug, for he was given, in order named, the following drugs, and none of them produced any oral irritation or cutaneous eruption: luminal, antipyrin, phenacetin, acetanilid, sodium salicylate, bromides, veronal and iodides.

Many other drugs are at times capable of exciting inflammatory or pigmentary changes in the oral mucous membrane. The prolonged ingestion of silver causes the deposit of silver salts in both the skin and mucous membrane (argyria). The "blue line" of lead and greenish or red line of copper

are known to all. McCafferty is shortly to report a case of fungating tumors of the hard palate from bromides. Hemorrhagic and bullous lesions of the oral cavity from iodids are not uncommon.

#### DISEASES INCIDENT TO MENSTRUATION

*Vicarious Menstruation.*—Vicarious bleeding from the gums with hemorrhages into the submucous tissues of the cheeks, lips, tongue and palate is occasionally observed at the menstrual period. The accompanying photograph

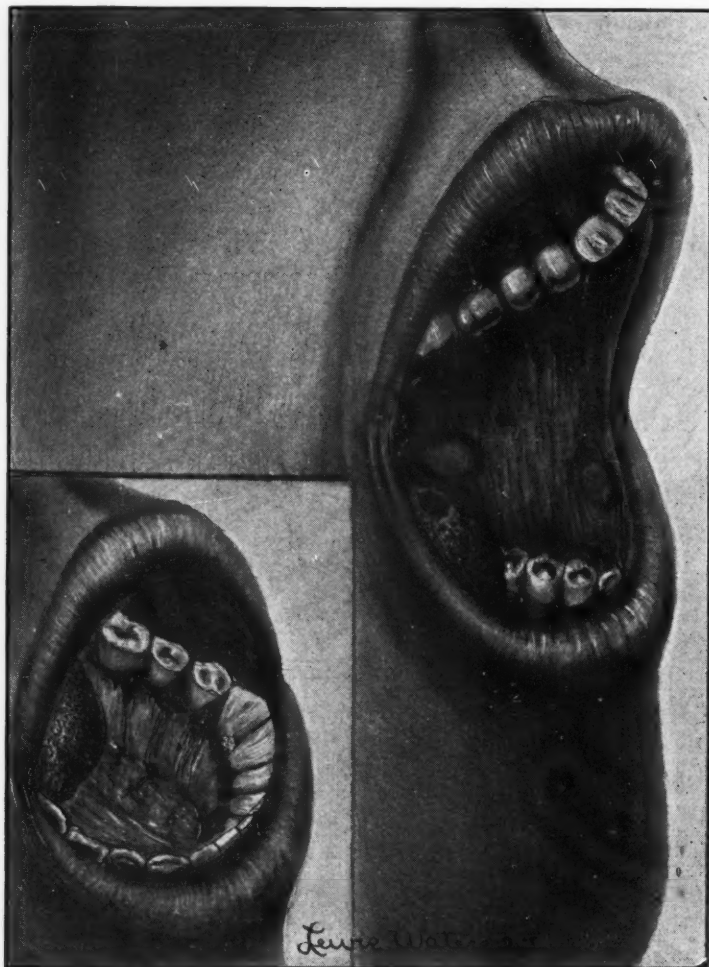


Fig. 5.—Vicarious menstruation.

depicts a patient in whom bleeding from the gums and hemorrhages at various portions of the oral mucous membrane were observed at each menstrual period. The patient presented an infantile type of uterus and had never menstruated from the normal channel (*Fig. 5*).

*Salivation.*—Definite relation between the genital organs and the salivary glands is shown by the moderate to marked increase in flow of saliva which is not infrequently observed at this period. Cases have been recorded where this symptom was a distressing one.

*Stomatitis.*—Aphthous stomatitis is not infrequently observed during the menstrual period. Routine examination of the oral cavity at this period will often show aphthae to occur regularly with each menstruation. The author has observed one marked example of this type of aphthous stomatitis. Aphthae appeared in the mouth regularly three days before each menstrual period. The number and severity of the ulcerations increased to the cessation of the menstrual flow, then rapidly disappeared to reappear again three days

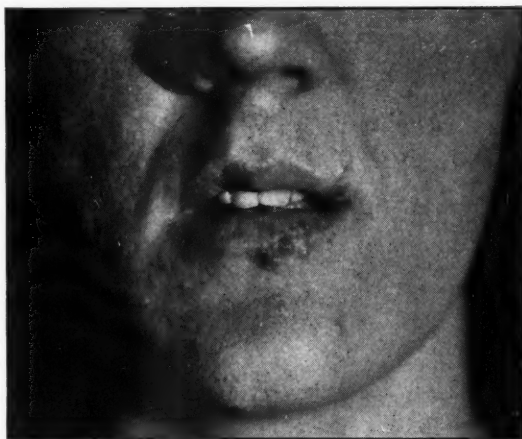


Fig. 6.—Menstrual herpes.



Fig. 7.—Erosions of the lips recurrent with each menstrual period. (Patient, Dr. W. A. Clark.)

before the next menstrual period. Chronic affections of the oral cavity, such as lingua geographica, and chronic gingivitis from Vincent's disease, usually show an exacerbation at this time.

*Menstrual Toothache.*—Menstruation is occasionally ushered in by a toothache of the neuralgic type, which appears suddenly several days before the menstrual period. This menstrual toothache has been shown to be due to a congestive hyperemia in the periodontal membrane about a pulpless tooth from the circulatory changes involved in menstruation.



*Menstrual Herpes.*—Recurrent herpetic and other types of eruptions of the glabrous skin are occasionally noted in women at the menstrual period (dermatitis dysmenorrhoeica). The accompanying illustration shows a menstrual herpes, recurrent at every menstrual period for a number of years (Fig. 6).

*Erosion of the Lips at Menstruation.*—A rather unique case of extensive erosions of the lips at the menstrual period has recently been seen through the courtesy of Dr. W. A. Clark of Houston, Texas.

*Case Report.*—Mrs. C. M. B., aged 31, complained chiefly of ulcerations of the lips, of four years' duration. Four years previously, just before the menstrual period, the patient noticed a small erosion of the lower lip. This lesion healed at the cessation of menstruation but recurred seven or eight days before the next menstruation, and, except in one month, had never failed to recur seven or eight days before each menstrual period, and had never failed to heal completely within three days after each monthly sickness. During this four-year period the lesions had become more extensive each month. By the end of the third year, the entire lower lip was the seat of confluent erosions at each menstrual period. Of late, the upper lip had become similarly involved. The erosions, as shown in the accompanying illustration (Fig. 7), were often covered with an adherent pseudomembrane or crust. Removal of the crust caused profuse hemorrhage. Spontaneous and complete healing occurred in the intermenstrual period. There was no history of drug ingestion at or previous to the menstrual period. At no time have vesicles been found and the patient states that the lesions always begin as erosions. The eruption has not been noticeably influenced by treatment.

#### LESIONS INCIDENT TO PREGNANCY

*Gingivitis Gravidarum.*—A special form of gingivitis, beginning about the fourth month of gestation and lasting until after parturition or well into the period of lactation, is frequently observed. This type of gingivitis is characterized by swelling and diffuse hyperemia of the marginal gum tissues, often with crescentic-shaped outlines. Tenderness of the gums is frequently marked and profuse bleeding often occurs on brushing the teeth. We have seen one case of this type erroneously diagnosed as Vincent's gingivitis, and considerable damage was done by scaling the teeth before a proper diagnosis was made. In marked cases of gingivitis gravidarum, extreme hypertrophy of the gingivae may occur (hypertrophic gingivitis of pregnancy), giving rise to polypus-like excrescences, which often cover the crown or cutting edge of a tooth or several teeth with proliferating masses of tissue. These hypertrophic tumors usually recede spontaneously after labor.

Benign new growths (epulides), caries, neuralgic dental pains, transitory benign plaques of the tongue, and alteration in the color of the teeth are often noted in pregnancy. These benign tumors and the transitory lingual plaques often disappear with the termination of pregnancy, caries and the neuralgic pains cease and the teeth again take on their normal color.

#### SUPERFICIAL AND DEEP YEAST INFECTIONS

*Thrush.*—Thrush, sore, or "white mouth" is a type of superficial mycotic stomatitis and gingivitis most frequently observed in nursing infants during the first few weeks of life. The condition, usually limited to the oral cavity of these infants, is frequently asymptomatic, but may spread to the skin of

the affected child and the nipples of the nursing mother. The disease is most frequently encountered in bottle-fed infants, especially in foundling homes where it may occur in epidemic proportions, and is caused by the deposit of an air-borne yeast plant, the *öidium albicans* (*Monilia albicans*) upon the nipples and other feeding utensils. In the oral cavity the condition appears as pea to larger sized patches or irregular branching streaks of snow whiteness, which closely resemble curdled milk deposited upon a macroscopically unaltered mucous membrane (*Fig. 8*). The velvety growth caused by thrush, in contradistinction to other superficial yeast infections observed in the oral cavity, is not firmly attached to the underlying tissues and can, therefore, be easily wiped away. These small patches occasionally spread and coalesce to form larger plaques which take on a dirty grey appearance and are accompanied by an increased flow of saliva. The disease may begin at any part in

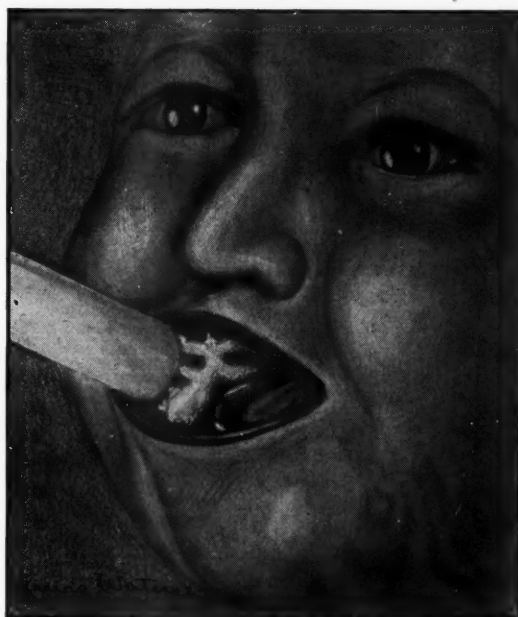


Fig. 8.—Thrush stomatitis.

the oral cavity. The sites of predilection are the cheeks, hard palate, and the margins of the tongue. In extreme cases the entire oral cavity may be involved.

The diagnosis is usually readily made by resort to the microscope. The treatment of choice is the application of 1 per cent gentian violet or a 2 per cent ferric chloride solution.

#### OTHER SUPERFICIAL YEAST INFECTIONS

*Macroglossia Mycotica*.—Castellani<sup>1</sup> has observed several cases of a peculiar enlargement of the tongue (*macroglossia blastomycetica*) due to a yeast organism. The tongue in these cases was greatly enlarged, occasionally painful, and the patients often experienced difficulty in eating and speaking. Deep scrapings of the tongue surface after drying and painting with iodine revealed a yeast-like organism (*Monilia macroglossiae Castellani*). This same

observer<sup>2</sup> has reported three cases of a diffuse stomatitis from which the *Cryptococcus graciloides* and *Bacillus vermiculoides* were isolated. In these cases slightly elevated whitish patches, often resembling incipient diffuse leucoplakia, were found covering various parts of the oral cavity.

Fihlo<sup>3</sup> has reported a case of chronic macroglossia mycotica resembling those reported by Castellani. White spots were first noted on the tongue. After a number of years these spots became confluent and the tongue greatly hypertrophied. The isolated organism was given the name *Monilia aldoi*.

Zeisler<sup>4</sup> has recently reported a mycosis of the lips and tongue, producing macrocheilia and macroglossia. In this case a yeast-like fungus (*Cryptococcus*) and a mould were demonstrated.

In the February, 1927, issue of this Journal, Dr. E. Lloyd Jones of Wheeling, W. Va., recorded a torula infection of the oral cavity, evidenced by nodular, noninflammatory swellings on the fauces and soft palate. After several months these nodular growths ulcerated, causing destruction of the soft palate and uvula.

*Monilia Infections* (Exclusive of so-called "Thrush").—Engman and Weiss,<sup>5</sup> 1920, reported a laborer, aged fifty-three, who presented over the entire left side of the buccal mucous membrane, invading somewhat the right side, a thickened mat of whitish filiform projections which was sharply defined against a healthy mucous membrane. Local treatment was of no avail. Even cauterization did not stop peripheral extension of the process. The *Monilia candida* was isolated from the verrucous process.

Zeisler has recently observed a yeast infection of the tongue in a woman, aged fifty-six, which was found to be due to the *Monilia pinoyi*. The tongue was enlarged and covered with narrow branching and arborizing white lines or streaks, slightly raised above the surface, adherent, and producing a geographic appearance.

Two cases of chronic, widespread *Monilia* infection of the mouth have been observed by the author in the past eighteen months.

CASE 1.—A man, aged 43, complained of "white patches" and soreness of the mouth. According to the patient's history, he had experienced recurrent white patches and intermittent "soreness" of the mouth for a period of ten years; yet previous to one year the condition was never serious enough to necessitate the services of a physician. At that time the condition suddenly became exaggerated, the number of white areas became so numerous as to cover almost the entire oral cavity, salivation was increased, and mastication was accompanied by severe pain. On the patient's initial visit to our office, the oral condition was as depicted in the accompanying illustration. At this time, the entire oral mucosa, exclusive of the dorsal surface of the tongue, was covered with a diffuse and patchy whitish growth. The mouth could not be fully opened and there was marked salivation and tenderness of the affected parts (Fig. 9). The gums in their entire extent were covered with a hypertrophic whitish growth several millimeters in thickness. Similar lesions appeared on the under surface of the tongue, buccal surface of the cheeks and the vermilion border of the lips. On the hard and soft palate these small whitish adherent patches and arborizing lines separated by normal mucous membrane presented a strikingly artificial appearance. The lesions in general suggested a diffuse leucoplakia of map-like arrangement. Local treatment was of no avail. Cauterization of the affected parts resulted in healing; yet, within a few weeks, the growth would extend from the periphery to cover the healed areas. Iodides by mouth and the intravenous injection of large doses of Lugol's solution were of temporary benefit. After the fourth intravenous injection of

Lugol's solution (doses of 3 c.c. each at two-day intervals) the lesions on the hard palate rapidly decreased in size, leaving the palate stippled with pinhead whitish dots closely resembling the area on the right side of the upper lip in Case 2. A slight thrombosis of the injected vein after the fourth injection of Lugol's solution brought about the patient's refusal of further treatment. The punctate lesions then rapidly increased in size to gain their former appearance.

*Laboratory Findings.*—The finding of yeast-like organisms in scrapings from the oral cavity has little importance, since these fungi are often seen in normal mouths. After carefully cleansing and drying parts of the affected mucous membrane, the areas were painted with the tincture of iodine and bits of the whitish membrane removed for microscopic examination and culture.

Microscopic examination of bits of membrane macerated in 10 per cent potassium hydroxide solution yielded myriads of round and ovoid yeast cells. Transplants of bits of this membrane to glucose agar tubes resulted in almost a pure culture of this fungus.



Fig. 9.—Case 1. Monilia infection of the oral cavity.

In order to test the pathogenicity of this yeast-like organism for the human, a pure culture of this fungus was rubbed into a lightly scarified area 1 cm. square on my left forearm. The inoculated and surrounding area was covered with a piece of rubber dam 3 in. square and firmly held by adhesive tape. Within forty-eight hours an acute vesicular dermatitis resulted over the entire covered area. This was accompanied by lymphangitis of the forearm, left axillary adenitis and rise of temperature. A pure culture of the organism was obtained from the contents of these induced vesicles, proving the pathogenicity of the fungus for the human. Complete healing resulted in about one week under rest and hot bichloride soaks.

CASE 2.—D. A. J. was a white man, aged 75 years. Since the age of 25, the patient had suffered from recurrent attacks of white patches and soreness in the mouth. During this period the mouth was never entirely free of lesions; yet inconvenience from the oral condition was experienced for only one or more months several times each year. During the past few years the oral vestibule had been so seriously involved that the patient had been unable to partake of solid food and his general nutrition had suffered greatly. The



entire oral cavity, with the exception of the gums, was involved, the eruption in the remainder of the oral cavity appearing like that pictured on the lips in the accompanying illustration (Fig. 10). This case closely resembled the one above reported with the exception that the mucous membrane between the affected areas showed an intense congestion, almost simulating the maroon-red of pellagrous stomatitis. Stained fresh preparations from various pieces of this membranous growth revealed many yeast cells and various bacilli and cocci common to the oral cavity.

For proper identification of the yeast-like growths, isolated from the oral cavity of these two patients, cultures were sent to Dr. Fred Weidman of the Laboratory of Dermato-

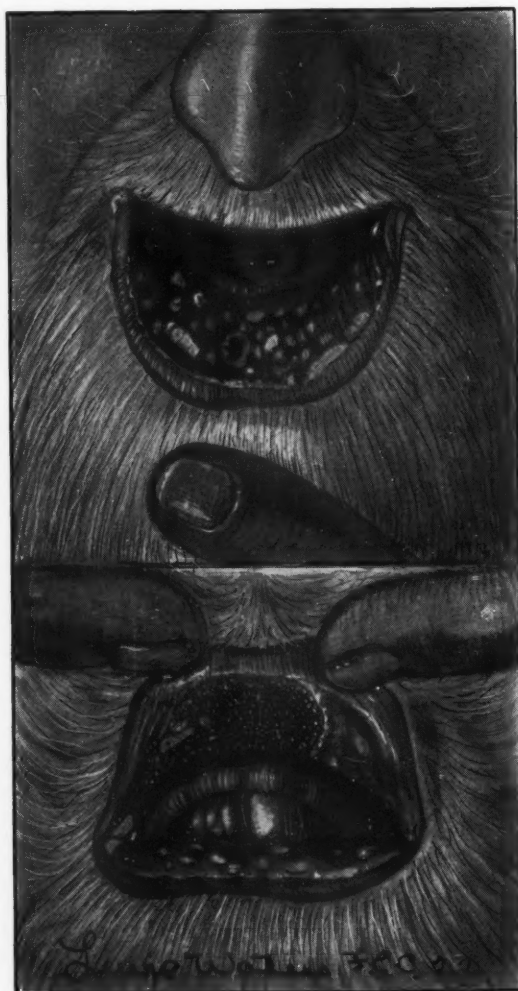


Fig. 10.—Case 2. *Monilia* infection of the oral cavity.

logical Research of the University of Pennsylvania. He has kindly furnished me with the subjoined preliminary report:

"The two strains appeared identical on glucose agar (Sabouraud's glucose formula) and employing Chassaing peptone. In seven days, colonies were 1 cm. in diameter, sharply margined, strongly creamy-yellow, and had a smooth, glistening surface. That is, there was nothing distinctive for determinative purposes; the texture was the thick pasty one common to many different yeast species. When three months old, the appearance was the same except that the colony was twice as large, the surface appeared less glistening, the texture correspondingly drier or even more pasty, and the color was an even deeper creamy-yellow, approaching a brown. The deeper parts of the colony did not extend deeply into

the substrate as is so often the case with the *Monilias* (*Myzelorrhizodes* of Ota) except with three of the numerous colonies studied; in the latter there were extensive downward prolongations into the substrate, even to the wall of the test tube.

"Under the microscope, there were but slight differences in morphology of the cells from the two strains. There were no true hyphae. Cells were medium-sized as yeasts go, spherical or slightly ellipsoidal, and contained one or two granules. Occasionally a fine, dancing granule was present in the vacuole. There was not a mucinous capsule around the cell (India ink technic). There were a few "pseudo-mycelia" in hanging drop culture of Case 2, but not in Case 1. But when pains were taken to take a thin stratum of the substrate at the extreme margin of the colony for examination, or the submerged portions immediately below the colony, long series of branching segments as well as chlamydospores were discovered similar to what is commonly figured for *Oidium albicans*. Ascospores could not be recognized in material grown upon plaster of Paris blocks and stained by Beauverie's method.

Animal tests were confined to material from Case 1. Generalized infection did not develop in either of the four guinea pigs injected intraperitoneally. There was a local subhepatic abscess formation in one animal and a local cutaneous abscess at the inoculation site in another.

"*Fermentation Tests.*—Organisms from the two cases behaved identically as tested in parallel at room temperature. They were comparatively inactive, affecting but four of the carbohydrates. They produced gas and acid in glucose within three days' time, and behaved similarly toward maltose, but a little less energetically. Such small quantities of gas and acid were produced in galactose that they were almost overlooked. They produced acid but no gas in saccharose, beginning in twenty-four hours and only at the surface of the medium; the amount at the end of five days was scarcely greater than that at the end of twenty-four hours. Other substances tested, dextrin, mannite, lactose, and salicin, were not affected. Gelatin was not liquified. There were no changes in litmus milk up to twelve days. Galactose was the particularly illuminating substance in connection with identification because the organism was so inert toward it, whereas the majority of other monilias act energetically upon it. Otherwise it would lie very close to *Monilia albicans* and the *Monilia alba* of Castellani. But this organism does not fit, biochemically speaking, any of those listed by Castellani and Chambers, and in the ordinary course of botanical events might justify the erection of a new species. This, however, is foregone in conformity with the present-day tendencies not to overburden medical and particularly mycological terminology with possible synonyms."

*Blastomycosis (Deep or Gilchrist Type).*—Blastomycosis of the oral cavity, exclusive of laryngeal blastomycosis, appears to be a distinct rarity. A cursory review of the literature has revealed but two cases thus far reported in the literature of this country. Copelli,<sup>6</sup> in 1913, reported a nodular blastomycotic lesion on the tongue associated with blastomycotic lesions of the feet. New,<sup>7</sup> in 1917, recorded a case of primary blastomycosis of the base of the tongue and pharynx. According to Castellani<sup>8</sup> oral blastomycosis has been investigated by Lutz and Splendore in South America. The skin eruptions in their cases were identical with those found in the common type of the malady, but the infection spread to the oral mucosa, involving the lips, gums, soft and hard palates, giving rise to numerous small, verucoid, papillomatous or frambesiform patches, which later frequently underwent deep ulceration. The disease finally invaded the pharynx, nose, larynx, and bronchi and usually terminated fatally.

A case of oral blastomycosis, resistant to all treatment and with fatal termination, has recently come under our observation.

CASE REPORT.—Miss M. L., white, aged 33, consulted our office concerning a growth on the lower gum of six months' duration. According to the patient's history, this growth

had followed slight injury to the gum while brushing the teeth. Examination showed a sharply demarcated verrucous mass on the lower gum in the region of the incisor teeth, almost completely filling the lower labial vestibule (Fig. 11). The mass measured 2 by 3 cm. and was elevated about 1 cm. Several small sinuses exuding pus extended into the depth of the tumor. Syphilis, tuberculosis and new growth were ruled out by the negative Wassermann and therapeutic tests, and the appearance of the lesion as an indeterminate granuloma on microscopical examination of a piece of excised tissue. A tentative diagnosis of fungus infection, probably actinomycosis, was made. This case was presented for diagnosis at the clinical session of this Society at our Dallas meeting two years ago. At that gathering, no diagnosis was made; yet the above diagnoses were forwarded.

Shortly after this meeting the patient consulted Dr. Kenneth Lynch, now of the University of South Carolina, who succeeded in demonstrating the blastomyces in fresh specimen and on culture. The patient was again observed about one year later. At this time there was extensive ulceration of the entire lower jaw and several sinuses pointed on the chin, cheeks and neck. The patient was very emaciated and was suffering from an exhaustion psychosis. The daily intravenous injection of Lugol's solution (5 injections

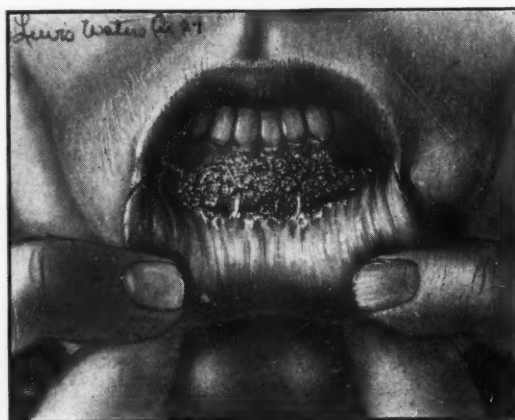


Fig. 11.—Blastomycosis.

of 6 c.c. each in 100 c.c. of distilled water) gave temporary improvement. According to the history of a friend, who lived with the patient in a distant town, death occurred some months later from what her physician considered to be a systemic blastomycosis.

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#### DISCUSSION (ABSTRACT)

*Dr. C. Augustus Simpson, Washington, D. C.*—I predict that Dr. Shelmire's article will be a wonderful reference in future years.

I have never seen Fordyce's disease disappear quite so quickly as he says. In fact, I have never seen it disappear at all. But of course geographical tongue is constantly coming and going, with little response to any treatment.

The color he spoke of in pellagra is quite as characteristic to me as the dermatitis of the hands and neck. I liken the color to the meat of the watermelon in the mucous membrane lesions in pellagra. It is the most vivid red that one can see. Of course the

menstrual eruptions we see often, and the eruption is usually of the herpetic type. Tongue and gum pigmentations we have seen very little of, except the bismuth discoloration.

The mucous cysts you have seen are not unusual, but quite interesting and alarming to patients. At times they become as large as an almond. I wonder how many of us have incised these cysts expecting a cure. I know of one case that was cut into a half dozen times, with prompt return, even after wiping the cavity out with carbolic. I think we are wasting time with treatment other than electric coagulation. I do not consider this lesion pre-cancerous or dangerous.

The little lakes or pools of blood on the lips are rather commonly met with. They are extravasation of blood in the tissues, surrounding a blood vessel, usually following trauma. Electric coagulation will cure these lesions in one treatment without danger. I do not consider them pre-cancerous, never having seen one undergo malignancy.

In angiomas of the mouth a well-equipped dermatologist will obtain excellent results. Many of these lesions are sent to us by surgeons who hesitate to cut them. Dr. Shelmire rightly considers any cutting operation dangerous. Coagulation is the ideal treatment. By this means the contents of the vessel are thrombosed and coagulated, after which the dried blood can be peeled or shelled out without hemorrhage. Coagulation is much quicker and more thorough than application of radium in these cases.

Ichthyosis mucosa is a very rare lesion. It is rare enough in the skin itself, and for it to occur on the mucous membrane, I think marks it as one of the most extraordinary cases shown today. I should not be surprised if the four children he has shown here are also examples of nevi hypertrophici of the mucous membrane.

At the New Orleans meeting I spoke of the granulating, velvety, sharply defined erosions of the mucous membrane very closely resembling the one Dr. Shelmire spoke of as pyogenicum surrounding the tooth. This lesion is seen in the male on the roof of the mouth or inner cheek as a buffy, red, granular erosion with sharp edges. No leucoplakia is present, but it tends to degenerate into a prickle-cell, fungating epithelioma that metastasizes and produces death. Some lesions last ten or fifteen years before metastasizing, often recur after radium or x-ray therapy, and electric coagulation offers the best chance of a cure. These eroded granular patches gradually and slowly spread over the mucous membrane as an advancing, elevated, sharply defined, parasitic edge. I have seen three or four such cases and I have considered them examples of Bowen's disease of the mucous membrane. I should like Dr. Shelmire to give his experience with such a lesion.

*Dr. Joseph Goldberger, U. S. P. H. S., Washington, D. C.*—Those appearances, that condition which Dr. Shelmire showed us this morning, come in the more severe stages of the disease. You do not ordinarily, and should not, expect to see it in the milder and earlier grades of the disease. If you do you will be very likely to be misled in your diagnosis.

The color is of great interest. We produce a condition that occurs spontaneously. In that condition the outstanding feature is a stomatitis. I have never been able quite to satisfy myself as to the distinctiveness of the tonic color at this stage. It is possible and quite probable that that arises from our limited experience. Consequently, we have hesitated. We have come to regard as very, very important that feature of the disease in the tongue.

*Dr. Thomas W. Murrell, Richmond, Va.*—An internist in Richmond has published several papers on pernicious anemia, and he states that achylia gastrica is frequently a part of the pathology of these cases. Might not some of the symptoms of the tongue in pernicious anemia be due to achylia gastrica?

Since in the lower animals food allergy is manifested in the intestinal tract, this same internist suggests that this may happen in humans and allergy play a part in some of these mouth conditions.

*Dr. George B. Lake, Chicago, Ill.*—I should like to emphasize the point of the development of the bubo in oral chancre. Though my experience has not been tremendous, the submaxillary bubo has been a feature of practically all the cases that I have seen.



In February, 1927, Dr. A. S. Warthin presented a paper before the American College of Physicians, in which he expressed the opinion that leucemia, Hodgkin's disease, mycosis fungoides and allied conditions are definitely malignant. He backed this up with statistics. He has had an enormous experience in pathology, and his statements are well founded and carry weight.

A few weeks ago, in Kansas City, I spent some time in Dr. Frank J. Hall's laboratory. He expressed the opinion that pernicious anemia is a malignant condition and said he had long felt that leucemia was malignant, and he had gross and microscopic specimens tending to bear out this statement.

The mouth lesions in leucemia and pernicious anemia struck me as being possibly a small bit of corroborative evidence along this line.

*Dr. Howard Hailey, Atlanta, Ga.*—Pemphigus of the oral mucous membrane and syphilitic cheilitis are two conditions worthy of mention.

The diagnosis of pemphigus is made, after frequent observations, by elimination. Syphilitic cheilitis may be mistaken for a dermatitis due to volatile oils in tooth paste.

An excellent treatment for cavernous angioma is the use of a small radium needle or 0.5 mc. radon seed placed in the center of the tumor.

*Dr. Lloyd W. Ketron, Baltimore, Md.*—I would like to ask Dr. Shelmire if he has examined histologically any of the varices commonly found on the lips of old people and spoken of as "blood blisters."

*Dr. W. H. Mook, St. Louis, Mo.*—Lesions of the mouth are difficult to diagnose in most instances. An accurate early diagnosis is always essential on account of the possible development of malignancy. If granuloma pyogenicum of any part of the mucous membrane of the mouth is diagnosed early, many malignancies may be prevented.

Many lesions of the mouth are congenital and familial. They are usually discovered when the patient develops cancerphobia, examines his mouth and finds a lesion which he had never seen before. These cases must be under observation for a long time before treatment of any kind is instituted.

*Dr. Everett S. Lain, Oklahoma City, Okla.*—I do not feel competent to add anything new to what Dr. Shelmire has said. I wish only to stress one thing he mentioned, which I have seen a number of times, namely: a bright red, burning, stinging, uncomfortable condition of the tongue and mucosa without any apparent etiology. Some time ago I observed that it was more especially present in areas which were in constant contact with newly made dental plates. I began to take histories more carefully and note that the most of these cases dated their origin to a few days after the new dental plates had been made. I eventually concluded that something in the dental plates was the cause. I inquired among my dental friends as to the composition of the rubber and eventually wrote to the manufacturers. One of them gave me a very courteous reply, which somewhat verified my conclusions, namely: that some of the cheaper rubber which was used in making the dental plates was colored with red oxid of mercury. Since that time I think I have noted that most of these cases have come from plates made by the "advertising, cut-rate dentists" who supposedly are using this cheaper material.

*Dr. Shelmire (closing).*—Time does not allow a discussion of all the oral affections presented here today. Some seventy-five lantern slides, depicting about fifty different oral conditions, were shown. In the paper presented for publication in our Journal only a few of the more common diseases of the oral mucous membrane were considered.

We are indeed indebted to Dr. Goldberger for his instructive discussion of the slides depicting pellagrous stomatitis. I have not been fortunate enough to see a case of Bowen's disease of the mucous membrane, as presented by Dr. Simpson.

# ABSTRACT OF CURRENT LITERATURE

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA  
DENTAL RADIOGRAPHY

BY DR. EDWARD PREBLE, New York City

NUTRITION AND PEDIATRICS

BY DR. SAMUEL ADAMS COHEN, New York City

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

## Orthodontia, Oral Surgery and Radiography

**The Treatment of Sensitive Teeth.** C. F. Bodecker (New York). The Dental Digest, August, 1928, xxxiv, 8.

This article is a brief summary of the entire subject and may be reproduced almost as it stands. Sensitive teeth are usually soft and poorly calcified and hence much in need of dental service. But nearly all teeth are sensitive to dental procedures. There is a double component in the patient's reaction to the latter, one of which is psychologic and due largely to the recollection of former painful experiences in the chair. The dentist may inform the patient of the periods of work most likely to be painful or may take the opposite course. He is in a mental conflict during these painful moments for he must do the job properly and at the same time must try to spare the patient's sensibilities. The author believes it best to warn the patient when he is to suffer unusually but to be able to do this one must be something of a histologist. Pain is conducted along the dentin, and soft dentin is the most susceptible to pain and in direct proportion to its softness. Pain is present in regions with much noncalcified material and the sensitive areas are the pulp, the dentino-enamel junction, the granular layer of Tomes and the interglobular spaces in the dentin. The greatest pain is caused by the bur, with excavators second. If the cavity can be kept dry the pain is lessened. In working with the stones, which require moisture, it is however a fact that pain is less marked than with other instruments. In excavating pain begins when we reach the dentinal tubules which communicate with the pulp and the operator should tell the patient when this stage is reached. When the deep part of the cavity is reached the pain which may be severe may be lessened by obtundents, usually a procain tablet forced by pressure into the space.

**The Infected Vital Pulp.** K. H. Thoma (Boston). *The Journal of Dental Research*, August, 1928, viii, 4.

The author sums up a considerable study of this subject in the following: All teeth that have been painful or very sensitive to hot food should be carefully investigated because such teeth often have infected vital pulps. The fact that a tooth reacts positively to so-called vitality tests or is sensitive when opened up or painful when the pulp is exposed does not prove that the pulp is not infected. A more careful study of the roentgen picture is requisite. If a large number of root-filled teeth, with or without infection, are present, they often distract attention from the small changes giving indirect roentgen evidence of an infected vital pulp. In addition to the roentgen examination a clinical examination of all suspected teeth should be made. The use of a dental diagnostician should be encouraged. He would act as a consultant with whom the various aspects of the case could be discussed. The general practitioner should find it of great advantage to employ the services of one of our well trained specialists rather than to send his patients to a commercial x-ray laboratory where men with questionable professional qualifications make business of one of the most important branches of dentistry. An infected vital pulp, no matter whether there are well marked periapical changes or not, is often a very important focus of infection and its removal gives promise of prompt relief of the systemic condition. The author gives 8 case histories of lesions due to infected vital pulps—facial neuralgia, general toxemia with lame joints, simulation of beginning tuberculosis, polyarthritis (2 cases), retrobulbar neuritis, high blood pressure and monoarthritis (wrist). All were cured by extraction.

**Action of Drinking Water on the Enamel.** F. S. McKay. *Water Works Engineering*, July 18, 1928.

The author has been contributing a series of articles to the same periodical on the probable effects of certain water supplies on the growing tooth enamel. The subject is an old one in dentistry, and in the *Dental Cosmos* for March, 1902, is a report by Dr. Eager of the U. S. Marine Hospital Service on the so-called "Chiae teeth"—so called from Professor S. Chiae who first reported on their existence. The peculiar mottling of the enamel is seen in certain suburbs of Naples in which the occurrence of the black teeth has long been attributed to the drinking of certain well water. In 1918 the author in collaboration with G. V. Black again brought up the subject in the *Dental Cosmos*, apparently in connection with studies in Italian emigrants. Finally in August, 1927, the author was enabled to make a first-hand study of the black teeth in one of the suburbs of Naples—Pozzuoli. By this time the inhabitants were no longer drinking the well water for a central water supply had been substituted and it was asserted that the black teeth no longer prevailed as an endemic affection. The author did not verify these claims for Pozzuoli but in another suburb of Naples, Resina, in which the water supply had likewise been changed, he found that only adults suffered from mottled teeth, the children being quite free. There seems to be no doubt that drinking water

from old wells sunk in lava beds was sufficient to give rise to this anomaly of the enamel although there is no valid explanation of the coincidence and we know further that the same kind of mottling can occur under various other circumstances, in which anything like volcanic soil can be readily excluded.

### Nutrition and Pediatrics

**The Anatomy of Growth.** T. Wingate Todd. *Northwestern Medicine*, April, 1928, xxvii, No. 4.

The author states that there is no doubt that on the average, children to-day are bigger and heavier than they were. Karl Pearson and Sir Arthur Keith have demonstrated this by their observations on the young people of England, and Horace Gray has obtained similar results in this country.

Growth consists of two phases, increase in dimension—quantitative; change in proportion—qualitative, and each of these phases may be influenced apart from the other.

In searching for a new principle for standardizing growth, Prof. Todd states that he has discovered a close time relation on closure of sutures and union of epiphysis. To him the qualitative differentiation of limb epiphysis seems to be the most practical.

In Cleveland for the past two years repeated observations upon the roentgenographic features of the limb epiphysis of between 600 and 700 children have been made, and as a result it was found that in the knee a criterion for estimating the stage of the child's development in terms of years was closely time-linked, and yet seemed independent of general body features such as height and weight.

**Growth Studies of Children with Diabetes Mellitus.** Julian D. Boyd and Martin V. Nelson. *American Journal of Diseases of Children*, May, 1928, xxxv, 753.

The authors state that since the beginning of the use of insulin it has been possible for children with diabetes to approach the status of normal children in contrast to the marked retardation of development shown previous to its use.

During the past five years, the heights and weights of sixty children having diabetes were observed by Boyd and Nelson, who chose as standards, values which represented the growth and nutrition of a superior group of children.

Studying their group of diabetic children as a whole, it was found that the average of these children, at the time the disease became manifest, was slightly overheight for his age and underweight for his height, and, moreover, the average rate of growth of these children is superior to the averages obtained from observations made on selected groups.

However, there were a few diabetic children under treatment who, for one reason or another, showed definite physical retardation.



As a result of their study the authors feel the same as Ladd, and also Hartman, that diabetes in itself, is not incompatible with normal growth, providing the control is such that prolonged and repeated hyperglycemia is avoided, and the child's nutritional requirements met by an adequate diet.

**The Fate and Development of the Immature and of the Premature Child**

Aaron Capper. *American Journal Diseases of Children*, February, 1928, xxxv, 262; March, 1928, xxxv, 443.

In a splendid contribution Capper, of Philadelphia, reporting from the Children's Clinic of the University of Vienna, presents the results of his study of the fate and development of the immature and premature child up to  $14\frac{6}{12}$  years of age. In all 333 cases are reported, 103 of which were examined by the author.

As defined by Capper, the term "immature" infant is proposed as signifying a specific condition, namely, any infant whether a single or multiple birth, born prematurely, at term, or even past term, whose weight at birth is below 2500 gm. (5.5 pounds).

Among the distinguishing characteristics of immaturity, such as exophthalmos, the thick languid hair covering face and body, and the flabbiness of the external ears due to lack of development of the elastic tissue of the body, is the disproportionately large head, which becomes more striking after the second month and continues to enlarge until after the eighth month.

Capper quotes Yeppo, who states that the head is normal, but the body subnormal in size. Between the eighth month and the second year when the brain ceases its active growth, the disproportion between the head and the remainder of the body disappears, since the measurement of the skull remains practically stationary while there is a rapid growth of the body. Rosenstern found that the smaller the weight of the immature infant at birth, the more frequent is the megacephaly (large head).

Although the etiology of the immaturity could not be determined, nevertheless, from this study and others, the conclusion is reached that the old teaching to suspect every immature or premature birth as having a syphilitic cause is erroneous.

Regarding the mortality of immature infants, Capper presents figures of 437 immature infants—45 per cent of these were dead at the end of the first year. After this period the mortality was only a little higher than in the case of mature infants. About 55 per cent of immature infants live until the end of the first year, 52 per cent reach school age, 51 per cent reach age of puberty.

The backwardness of growth in height of immature infants is more striking during the first six or seven years than during the period from seven to ten years, the lagging in growth being somewhat greater among girls than among boys. There is a definite relationship between lagging in growth and weight at birth, the smaller the weight at birth the greater the retardation in growth.

It is interesting to note that the principal cause of the retardation in height of the immature child is due to the delay of growth of the extremities, which persists until about the tenth year.

In addition to these children being below the average height, their weight also falls below the average, and persists even up to puberty. The figures show that the boys are more subnormal than the girls.

Regarding the measurement of the skull and also the chest, it has been noted that the circumference of the skull of the immature child up to twelve years of age remains slightly below that of the mature child, and that afterward it even overtakes it somewhat. On the other hand, after the sixth year the chest of the immature child assumes larger proportions than normal, and continues to remain above the normal line until past puberty.

According to the peledesi index, and also from the author's clinical impressions, over two-thirds of these boys and over one-half of these girls were undernourished.

The author generalizes in regard to the mental development of these children, and states that the immature child will become the backward child, and is the potential future psychopathic or neuropathic patient, and even the potential inmate of the Home for Imbeciles or Idiots. The immature child is usually delayed in its physical development and is usually a backward pupil in school.

However, from the author's observations, and from perusing the literature it is evident that cerebral injury is one of the most common causes of congenital mental inferiority.

In immature infants rickets is almost a constant feature, and prophylactic measures are advised shortly after birth. In a large number of immature children dentition was delayed. Moreover, a number (exact amount not given) showed considerable dental caries, especially of the incisors.

When these immature infants are born, prevention of infection, maintenance of body heat and proper nutrition are the three factors to bear in mind in their treatment.

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## EDITORIALS

### Breach of Contract Protection

THE March issue of THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY, AND RADIOGRAPHY called attention to the fact that liability insurance as issued by the majority of companies at that time, was unsatisfactory to the professional man because it did not offer protection covering all the conditions arising in the conduct of practice.

Most policies simply protect the individual against suit brought for personal injury or death. Some of those policies were so limited that they did not protect the policy holder against injury or error of judgment which might result from the act of an assistant or associate. None of them mentioned protection against suits arising from alleged breach of contract.

As a result of the editorials appearing in this Journal we have received considerable correspondence from dental societies, individuals, and even from

attorneys in insurance companies. It is very evident that the profession had been unaware of the limits of protection offered by the average liability insurance policy. Attorneys in insurance companies ridiculed the idea of a company issuing a policy which would carry breach of contract protection.

The facts responsible for the aforementioned editorials arose out of a suit being filed against an orthodontist for alleged breach of contract. Fortunately he held two insurance policies. Neither policy protected him against breach of contract. One specifically limited protection to cover damages arising from personal injury or death. One company absolutely refused to handle the breach of contract suit, claiming it was not a part of their policy, while the other company defended the suit because they believed it was a false accusation. The outcome was successful.

Since that time these two companies have written more liberal policies. The Medical Protective Company of Fort Wayne, Indiana, which was the company who defended the suit, have sent letters to their policy holders advising them of a policy whereby they will protect against suits arising as result of professional conduct. In fact this policy is so liberal that the insurance commissioner of one state has objected to the protection offered.

The United States Fidelity and Guaranty Company of Baltimore has written a liability policy with breach of contract protection in some states. We do not know whether they have made it a universal policy. However, it demonstrates that the demands of the profession have been recognized by at least two companies.

We believe that the campaign carried on by THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY regarding the defense of liability policies has had something to do with the issuing of the policies referred to. Unless other companies are willing to write as liberal policies as the Medical Protective Company or the United States Fidelity and Guaranty Company, it is our belief that the profession should see that their insurance is given to those companies who offer them the best protection.



## ORTHODONTIC NEWS AND NOTES

### First District Dental Society State of New York

The Fourth Annual Meeting for Better Dentistry of the First District Dental Society will be held at the Hotel Pennsylvania, New York City, December 3, 4, 5, 6, 1928.

The Committee has added a full day to the meeting this year, therefore there will be five clinic sessions, three general lecture sessions and one session devoted to lectures of the four Sections of the First District Dental Society.

The same plan of subscription will be continued, namely, \$5.00 admits a member to all sessions.

Among our essayists and clinicians will be, Dr. C. N. Johnson, Chicago, Ill., Dr. Robert R. Gillis, Hammond, Ind., Dr. Robert H. Ivy, Philadelphia, Pa., Dr. Benjamin Tischler, Boston, Mass., Dr. Raymond A. Albray, Newark, N. J., Dr. John G. Logan, Portage, Pa., and Dr. Percy R. Howe, Boston, Mass.

There will be a manufacturers exhibit under the auspices of the Manufacturers Club of the American Dental Trade Association and Independent Dental Manufacturers Association in the hotel during the meeting.

Address all communications relative to subscriptions, clinics, etc., to E. M. Davies, 2 East 103rd Street, New York City.

John T. Hanks, Chairman of Committee.

### St. Louis Study Club of Dentistry

The St. Louis Study Club of Dentistry, organized in 1919 for the purpose of teaching advanced dental subjects to ethical dentists, without charge, will open its eleventh annual term on Wednesday, October 3d, 1928. The sessions will be held from 8.00 to 10:00 P.M. All classes are to be given in the Dental Department of the St. Louis University.

The following subjects will be covered during this term:

- Dental Roentgenology
- Fixed Bridgework
- Full Dentures
- Dental Ceramics
- Conduction and Local Anesthesia
- Rizadontia
- Operative Dentistry
- Dental Economics
- Clinical Dental Prophylaxis
- Anatomy and Dissection of the Head
- Oral Diagnosis and Diseases of the Mouth

Bulletins, giving detailed information regarding the Study Club and its courses, may be had by addressing Dr. Frank C. Rodgers, 309 Wall Building, St. Louis, Mo.

